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DAVID JARDINE JARDINE

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OR,

Universal Dictionary

OF

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THE

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OR,

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OF

Arts, Sciences, and Literature.

BY

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WITH THE ASSISTANCE OF

EMINENT PROFESSIONAL GENTLEMEN.

ILLUSTRATED WITH NUMEROUS ENGRAVINGS,

BY THE MOST DISTINGUISHED ARTISTS.

IN THIRTY-NINE VOLUMES.

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CYCLOPÆDIA:

OR, A NEW

UNIVERSAL DICTIONARY

OF

ARTS and SCIENCES.

MACHINERY.

MACHINERY *for manufacturing Ships' Blocks*, in the royal dock-yard at Portfmouth. Thefe machines are the invention of Mark Ifamberd Brunel, efq.: they are the moft ingenious and complete fyftem of machinery for forming articles in wood, of any this kingdom can produce, being not lefs creditable to the country as an exhibition of mechanical talent, than advantageous to the government in the economical fupply of an article of fuch immenfe demand for the navy. The great celebrity thefe machines have obtained, and the valuable information their publication will convey to mechanics, has induced us to devote feven of our plates to their explanation, and will apologize for our entering into fo long an account of the manufacture of an article fo trifling as a fhip's block; though even this fhould not be defpifed, when its importance in naval affairs is confidered, and how often the fafety of a veffel may be endangered by the failure of a fingle block, regulating any important action in a fhip's working. It is of great confequence that thefe, in common with every other part of a fhip's rigging, fhould be made in a moft accurate and fubftantial manner.

The block machines are particularly worthy of notice, as performing moft of the practical operations of carpentry with the utmoft accuracy and difpatch, and will be found applicable to many other purpofes befides the fabrication of fhips' blocks. Indeed, in the dock-yard all the fmall wooden articles required in the navy can, in fome part or other, be executed by the machinery in the *wood mill*, as the building containing them is very properly called, and the largeft timber is converted and fawn up into any fcantling, by feveral curious circular and reciprocating faws adapted to various purpofes. The fucceeding operations, performed by the fmaller machines, are boring, mortifing, many very ingenious applications of turning for a variety of purpofes, both in wood and iron, rivetting, drilling, broaching, burnifhing iron pins, &c. as we fhall defcribe at length. The different kinds of blocks ufed in the rigging of a fhip are defcribed in our article BLOCK, and alfo the manner of conftructing them by the old method which was then in practice, the machines in queftion having been erected fince the printing of that article, or, at leaft, brought into ufe, or we fhould have defcribed them in their proper place; but even here they are by no means mifplaced, being the beft examples of practical machinery, of any we could felect from the numerous manufactures our country contains, being adapted to perform operations which are generally underftood, but which have hitherto been executed by manual labour and dexterity only.

The blocks for the royal navy were for many years previous to 1807, when the machines were fet to work, fupplied, on contract, by Mr. Taylor, of Southampton, who employed a large mill, containing powerful fawing machines, for converting the timber into the proper fcantling for the blocks, but left them to be formed by manual labour, as related in our article BLOCK: the mill alfo gave motion to lathes of the common conftruction for making the fheaves. Except what was done at this manufactory, and fome few curious machines devifed by general Bentham, the credit of bringing the block manufacture to its prefent perfection is due to Mr. Brunel, who has difplayed as much judgment in the divifion of the operations by the feveral machines, as ingenuity in the contrivance of their parts, which are admirably well calculated to produce their intended effects. The greateft attention has been every where paid to that form of conftruction which would admit of the moft perfect workmanfhip in the execution; in this, the ideas of the ingenious inventor have been ably feconded

Strahan and Prefton.

by Mr. Henry Maudflay, of Weftminfter-road, London, who made thefe machines with the moft fcrupulous attention to accuracy and durability, at the fame time preferving an elegant proportion in their form, which is very agreeable to the eye. The framing of all thefe machines is made of caft iron, and many of thofe parts which are expofed to violent and rapid motion are made of hardened fteel to avoid wearing: and where this is impracticable, fuch parts are formed fo that they can be readily renewed when worn out. A better proof of their durability cannot be defired, than the circumftance, that the machines have been now finifhed four years, and have been in continual work during that period, fome of them being fubject to very violent and rapid action; yet, among forty-three of them, nothing has happened to require any repairs of fufficient confequence to engage the affiftance of the maker or inventor; the trifling repairs of the cutting tools, &c. being made by the workmen on the fpot, and of all fuch parts they have duplicates provided, by which any failure can be reftored in a few minutes. Thefe circumftances we particularly recommend to the attention of manufacturers who have occafion to employ extenfive fets of machinery; for this, when well conftructed, though expenfive in the erection, is cheaper in the end than imperfect works, which require conftant repair, the expence of which is the leaft evil; as it generally happens that a machine will fail at that time when it is moft wanted, in confequence of being then moft worked; and the lofs occafioned by the ftoppage of great works, particularly where many people are employed, is too evident to require our notice. In the fame manner, an attention to neatnefs, in the appearance of machinery, has its advantages, by inducing the workmen to be careful of the machines they work at, to preferve them from the flighteft injury, and to keep them clean from duft, which, trifling as it may appear, is a very effential point in the prefervation of thofe parts which are in rapid motion with friction againft other parts, for duft getting between fuch furfaces grinds them away very faft, and in their moft effential points.

Workmen and people employed about machines have no intereft in their prefervation, farther than to avoid fuch figns of violence and careleffnefs as may be immediately detected by their fuperiors; but by introducing an emulation among them, of having the neateft machines in the factory, and of keeping them in the beft order, they may be induced to take as much care of them as if they were their own property. This fact is well known to fome of the largeft proprietors of cotton and woollen mills, though as much neglected by others. The machines contained in the *wood mill* at Portfmouth may be feparated into four claffes. 1. The fawing machine for converting the large timber into proper dimenfions for the fmall machines to operate upon, confifting of the large machines for fawing up the elm trees from which the fhells of the blocks are to be made, and the fmaller fawing machines for cutting up the lignum vitæ for the fheaves. 2. Thofe machines which are employed in forming the fheaves. 3. Thofe which form the iron pins for the blocks. And, 4. Thofe by which the fhells of the blocks are manufactured. They are all fituated in one large mill, which confifts of two very tall buildings, or wings, having a fmaller and lower one between them, lighted by fky-lights in its roof. The lower part of one of the wings is appropriated to the two fteam engines, which actuate the whole, as alfo fome immenfe chain pumps, which are occafionally employed in draining the dry docks. The mill has two engines of thirty horfe power, one erected by Meffrs. Boulton and Watt, and the other by Meffrs. Murray and Wood of Leeds. Either of thefe can be applied indifferently to work the chain pumps, or for turning the wood mill, and their power is tranfmitted by a train of wheel-work to an horizontal fhaft, extending along the centre of the middle building, very near its roof, and upon this are a number of wheels and drums, which, by endlefs ropes and ftraps, communicate motion to the various machines for making the block fhells, which are fituated on the ground, in the central building. They are feventeen in number: fourteen of this number conftitute three complete fets for making blocks of different fizes following each other, from four inches in length to eighteen; the length in inches being the denomination of the fize of fhips' blocks. There is alfo a large machine for boring parts of thofe very large blocks which are called made blocks, and cannot wholly be made by the machines; it alfo cuts fhot racks by tools for the purpofe: and here are two machines for turning *dead eyes*, which are blocks without fheaves, for attaching the fhip's fhrouds to her fides.

The ground-floor of the wing oppofite to that containing the fteam engines, is appropriated to feven large fawing machines for cutting up the trees; and the floor over it contains three fawing machines for cutting up the trees of lignum vitæ: alfo, the fmall machines for making the fheaves, which are thirteen in number, and a fmall room, containing five machines, where the iron pins are turned and polifhed. In the upper parts of both wings of the mill are warehoufes for containing the immenfe ftock of finifhed blocks, which are always kept in ftore for armaments, and feveral workfhops with common lathes, worked by the mill, for making and finifhing various fmall articles of a fhip's furniture. Many of them are, in part, made by fome of the block machines, in addition to all thofe kinds of blocks which we have explained under Block. Some of thefe articles are *dowels*, for uniting fhips' timber; *treenails*, *marling fpikes*, *ferving mallets*, *pump buckets*, and many other trifles which it is unneceffary to particularize. At the top of one building is a large water ciftern, kept always full by a pump belonging to the engine, and provided with pipes which conduct the water to every part of the works, and are in every room furnifhed with fcrew caps, at any of which an engine hofe can be fcrewed on in the event of a fire, which is fomewhat to be dreaded when they work by lamps in the winter time, as the great quantity of chips and faw duft, always lying about in every part of the mill, might be fet on fire. To avoid this danger as much as poffible, the lamps are included in glaffes of a fimilar figure to a long cafk, with a cap on the top, which has holes to allow the fmoke to pafs out, but fo contrived, that it is impoffible a fpark fhould efcape. Upon the roof-leads at the top of all, are racks for fetting up the very large blocks to feafon by gradual expofure to the weather, or they would, if all at once fubjected to the fun or rain, crack and fplit in all directions, fo as to fall to pieces.

We fhall commence our defcription of this ingenious mill by an enumeration of the feveral proceffes the blocks and their fheaves are fubjected to, beginning with the rough elm and lignum vitæ trees, and tracing them through their various ftages to the finifhed blocks with their fheaves, and, in like manner, the pins for them.

The elm trees are firft cut into fhort lengths, proper to form the various fizes of blocks, by two large fawing machines, one a *reciprocating*, and the other a *circular faw*. Thefe lengths of the trees are next cut into fquares, and ripped or fplit up into proper fizes by four *fawing benches*, with

with circular ſaws, and one very large *reciprocating ſaw*, which is uſed for cutting up the pieces for very large blocks. Theſe are the ſeven machines in the wing.

The ſcantlings, thus prepared for the blocks, are perforated in the three *boring machines*, with a hole through each, to contain the centre pin for the ſheaves of the block, and as many other holes in a perpendicular direction to the former, as the number of ſheaves it is to have, theſe holes being intended as the commencement of the ſeveral mortiſes to contain the ſheaves.

The blocks are now mortiſed in the three *mortiſing engines*, which elongate the holes above-mentioned to their proper dimenſions.

The angles of the blocks are now cut off by three *circular ſaws*, preparatory to reducing them to the elliptical figure they are to have.

The outſide ſurfaces of the blocks are next formed to their true figure by the three *ſhaping engines*, each of which forms every part of ten blocks together.

The ſcores, or grooves, are next formed round the block, to receive the rope or ſtrap by which they are ſuſpended; this is done by the two *ſcoring engines*.

The blocks are now trimmed by hand labour, to ſmooth and poliſh them.

For making the ſheaves, the firſt proceſs is cutting pieces or flakes off the end of the trees of lignum vitæ, of a proper thickneſs to form the ſheaves: this is performed by three *converting machines*, one a reciprocating ſaw, and the other two circular ſaws.

Theſe flakes are made circular, and the centres pierced in two *rounding* and *centering* machines, or trepan ſaws.

A hole is now excavated in the centre of each ſheave, to inlay the coak or piece of bell metal which is fitted into the centre of each ſheave, to form a ſocket for the centre pin.

The coaks, being put into their places, are rivetted faſt by the two rivetting hammers.

In ſome kinds of ſheaves, three ſmall holes are drilled through each ſheave, and alſo paſſing through the coak, by the *drilling machine*; and ſhort wire pins, cut by the *cutting ſheers*, are put through theſe holes; then they are rivetted down at the ſame time with the reſt of the coaks by the rivetting hammer. This method is not always adopted, the coaks being found to be firm enough without theſe pins or rivets.

The centre holes through the coaks are next broached out to a true cylinder in the three *broaching engines*.

The laſt proceſs is turning the faces and edges of the ſheaves to a flat ſurface, in the three *facing lathes*, which alſo form the groove round the edges of them, for the rope which encompaſſes them when in the block. This completes the machines for making the ſheaves. The iron pins are forged by two ſmiths, in the uſual manner of ſuch articles, between two ſwages or tools, each having a ſemicylindrical cavity formed in it, ſo that the two, when put together, form a cylinder. The heated iron being laid in one of theſe, the other is put over it, and beat with a hammer, by which means it forms the pin to a cylinder. The end of the pin is left ſquare for a very ſhort length. They are in this ſtate turned ſmooth and true in the *pin turning lathe*, and afterwards poliſhed and made perfect on the ſurface in the *poliſhing machine*.

Such blocks as are from four to ſeven inches in length, are generally fitted with wooden pins, which are turned in a ſimple lathe called a *whiſtet*.

There are alſo two machines for making *dead eyes*, and a large apparatus or boring machine for making the largeſt ſizes of blocks, of that denomination called *made blocks*, ſome of which are as much as four feet in length, and with four ſheaves. They are of courſe made up of planks, and this machine is uſed for boring the holes of the numerous bolts which are uſed to unite theſe parts: it is alſo uſed occaſionally to cut out ſhot racks. The whole of this liſt contains 43 machines.

We ſhall now proceed to a deſcription of the ſeveral machines, beginning with the large ſawing machines for elm trees, contained in the ground-floor of one of the wings of the mill. In the centre of this room is a vertical ſhaft turned by the machinery, having a capſtan on the lower end of it, round which a rope is paſſed, to draw any log of timber into the mill from the yard, where the ſtore of elm is kept. The trees are by this means conducted to the firſt machine, which cuts them off acroſs into proper lengths, to form ſuch blocks as the tree ſeems beſt adapted for. Two machines are employed for this purpoſe, one a circular and the other a reciprocating ſaw: the latter we ſhall deſcribe firſt.

The great croſs-cutting Saw.—The tree ſubjected to the action of this machine is placed on a long frame or bench raiſed a little from the floor, and at the end of it is erected a frame, compoſed of vertical poſts and croſs timber, in the manner of a ſmall and low door-way: through this frame the end of the tree is drawn by the capſtan above-mentioned, its end projecting as much from the ſurface of the frame as is intended to be cut off; and it is faſtened in the frame from rolling ſideways, by a lever, which can be readily made to preſs upon it and hold it down. The ſaw itſelf is a ſtraight blade, fixed into a wooden handle or pole at each end, to lengthen it: one of theſe handles is connected by a joint to the upper end of a lever, bent like an L, and having its centre beneath the floor: the horizontal arm of the lever is connected by a ſpear rod, with a crank on the end of a ſpindle near the cieling of the room, the motion of which is regulated by a fly-wheel. By this means the ſaw has a reciprocating motion from right to left, nearly in a horizontal poſition, and exactly acroſs the log it is to cut off, imitating in its motion the carpenter's hand ſaw, conſidering his arm as the arm of the bent or L lever. The teeth of the ſaw are of courſe on the lower ſide of the blade, and are ſloped ſo as to cut in drawing towards the lever. It riſes and falls freely upon its joint at the end of the lever, and can be lifted up by the handle, at the oppoſite end of the blade, to take it off its work, which it follows up, by its own weight. The machine being at reſt, is prepared for work, by fixing the log in the frame as before mentioned, ſo that the ſurface of the frame interſects the log at the place where it is intended to be croſs-cut. The ſaw, which was before lifted up by its handle, to be clear above the log, is now ſuffered to reſt upon it, in the place where the cut is to be made; and to guide it at firſt ſetting in, the back of the ſaw is received in a ſaw kerf, made in the end of a piece of board, which is attached to the frame over the ſaw, but ſlides up and down in a groove to reach the ſaw at any height, according to the thickneſs of the log lying beneath it. Being thus prepared, the machine is put in action by a rope or ſtrap which turns the fly-wheel and its crank. This giving a vibration to the bent or L lever, cauſes the ſaw to reciprocate horizontally acroſs the tree, until it cuts it through: it follows up its cut by its own weight alone, but the attendant can at any time lift up the ſaw from its work, though its motion continues, by means of a rope which ſuſpends the handle of the ſaw when required. As the ſaw gets into the tree it quits the guide above-mentioned, which becomes the leſs neceſſary as the ſaw goes deeper; a ſaw having no tendency to alter its firſt courſe, when cutting acroſs the

 grain

grain of the wood. We admire the ſimplicity of this machine, which nevertheleſs executes its work with much accuracy and expedition. It might be very uſefully employed in many ſituations where great manual labour is ſpent in croſs-cutting large logs of timber.

The croſs-cutting circular Saw.—This machine is for ſimilar purpoſes, and ſtands cloſe by the former. It is a circular ſaw, whoſe ſpindle is ſo mounted, as to move in any direction parallel to itſelf; the ſaw all the while continuing in the ſame plane, and revolving rapidly upon its axis, cuts the wood it is preſented to, and as it admits of being applied at firſt on one ſide, and then on another ſide of the tree, a ſaw of moderate dimenſions will be ſufficient to divide larger trees, than could otherwiſe be done by it.

Plate I. (*Block-Machinery*) contains two plans and two elevations of this machine. *Fig.* 1 is an elevation, ſhewing the tree A A (which is to be cut) lengthways. *Fig.* 2 is taken in the other direction, and therefore ſhews the tree endways. *Fig.* 3 is a plan, anſwering in its poſition to *fig.* 1, and ſhews the whole of the mechaniſm; but the plan (*fig.* 4) only contains the lower parts. The ſame letters of reference refer to all the figures. A A, as before mentioned, is the tree intended to be ſawn acroſs: it lies upon a framing of timber B, which may be conſidered as its bench or ſupport. Acroſs the end of this frame a ſtrong timber, or ground ſill, C, is framed, and in this two uprights, R, S, are erected, which, with a croſs beam at top, form the frame, which gives the means of confining the tree upon the bench B while it is cut. This is done by means of a lever D, one end of which is hitched under a bolt put in a hole in the poſt S of the frame, to ſerve as a fulcrum, and the other end paſſes between the face of the poſt R, and a piece of wood, *a*, fixed thereto, and the lever, being forced down upon the tree, is kept down by a bolt put through a hole in the piece *a*, and alſo into the poſt. The other end of the lever is retained by a piece of wood ſimilar to *a*, (ſee *fig.* 1.) fixed to the poſt S; by this means the tree is held ſteadily whilſt it is ſawn. T is a roller, or capſtan, to advance the tree forwards on the bench: it is turned round by means of the handſpike E, which is fitted looſely upon the centre pin of it, and has a ſmall click engaging the teeth of a ratchet wheel *b*, fixed faſt upon the gudgeon or centre pin. The handſpike, being worked in the manner of a pump, turns the roller about a few teeth of the wheel at every ſtroke, and by a rope wound on the roller draws up the tree: *d* is a click which detains the teeth of the ratchet wheel, and prevents the roller running back, after being moved by the handſpike. A framing of wood is placed beneath the tree at F, to form a continuation of the bench B, but leaving a ſpace between it and the front of the beam C, for the ſaw to deſcend into when it divides the tree, when the frame, F, will ſupport the piece cut off. A piece of wood is faſtened down upon the frame F, at *f*: by means of a ſcrew, it acts as a ſtop to the end of the tree, and meaſures out the quantity to be cut off from the end of it: it is of courſe adjuſtable, and may be fixed at any diſtance from the end of the bench B, according to the length intended to be cut off the end of the tree. We now come to deſcribe the mechaniſm connected with the ſaw, which is ſhewn by G, fixed on the end of a ſpindle *g*, mounted in a frame conſiſting of two ſide-beams, H, H, connected by croſs pieces, I, I, K, L, and ſtrengthened by diagonal bolts or tyes, *e*, *e*: the top croſs piece is formed of iron, as ſhewn in *fig.* 3, and its ends are jointed to the end of a frame M M, poiſed in the manner of the balance-beam of a draw-bridge, on a fulcrum ſupported by the fixed framing of the machine, conſiſting of two poſts, N, extending from the floor to the ceiling, and connected by a croſs beam O O. By this means, the ſpindle of the ſaw can be moved in any direction at pleaſure, but always preſerves its paralleliſm, aſcending and deſcending by the inclination of the frame, M M, upon its fulcrum, and moving from right to left by the frame H, ſwinging upon the joints connecting and ſuſpending it: from the former the ſaw receives its motion from the mill by a ſtrap *h*, which encompaſſes a pulley *i*, *figs.* 1 and 2, contained in an opening of the iron top, L, of the frame H; it is faſtened on a ſhort ſpindle, which is exactly in a line with the joints connecting the two frames, M M and H: upon the ſame ſpindle is another pulley *k*, which by the ſtrap, P P, gives motion to a pulley *l*, fixed on the ſpindle of the ſaw; *m*, *m*, *figs.* 1 and 2, are two ſmall wheels to guide the ſtrap, and tighten it up, if neceſſary, when it ſtretches; the main ſtrap, *h h*, is guided over pullies *n*, which, being near the centre of motion of the frame M, are not materially affected by the motion of the frame either to tighten or looſen the ſtrap which paſſes round a large drum, turned by the mill. The attendant has government of the machine, to move the ſaw in different directions by two winch handles, V and W: the latter of theſe is on the end of an axis *w*, having two pinions upon it, which operate upon two racks at the end of wooden rods, Q, Q, *figs.* 1 and 2, which are connected with the end of the great frame, M M, at the ſame joints which connect the two frames together; ſo that by turning this winch, W, in one direction, it elevates the ſaw, and in a contrary direction, depreſſes it, by inclining the frame, M, on its centre. In like manner, the handle, V, gives motion by a wheel and ſpindle to a ſimilar ſpindle *v*, which actuates by its pinions two rods, X, X, jointed to the ſuſpended frame H, and therefore moves the ſaw nearer or farther from the workman who ſtands at the frame N N; the two frames, H and M, are greatly ſtrengthened by the rods, Q, Q, and X, X, being connected with them; for as the two pinions act equally upon the two rods, and thus move both ſides of the frame alike, they preſerve them from twiſting, which would cauſe the ſpindle of the ſaw to deviate from the paralleliſm; but to have this effect, it is neceſſary that the pinions ſhould fit their racks accurately. For this purpoſe, the rods, Q and X, to which the racks are affixed, are ſupported behind by two rollers, *y*, *y*, applied to the back of each. Theſe rollers are fixed in a triangular iron frame, the third angle of which is fitted upon the axis of the pinions; and by this means, the teeth of the racks and pinions are always kept in accurate contact, though the racks neceſſarily alter their inclination at times, according to the poſition of the frames to which they are joined.

The operation of this very ingenious machine is almoſt evident from the deſcription. The tree being fixed, the attendant takes the handles V and W, one in each hand; and by turning one or the other, directs the ſaw at pleaſure to any ſide of the tree. At firſt he applies it, as in *fig.* 2, and it cuts half through the tree from that ſide, with very great rapidity; then he gradually raiſes it up by the handle W, and cuts into the log at the top ſide; but all the time the ſaw continues in the ſame plane: and at laſt he brings it over to the oppoſite ſide, and cutting through it there, the log is ſeparated, even if it is nearly of the ſame diameter as the ſaw. The ſaw is now moved by its handles to be clear of the tree, the piece removed, and the tree advanced to cut another length. This machine is ſo expeditious and accurate in its performance as to take the lead of the other, except for ſuch trees as are of a ſize too great for the circular ſaw. It has, ſince its firſt erection, received an addition of a rack and pinion to the frame R S, for holding the tree, which preſſes down the tree inſtead of the lever, and holds the wood in the manner of a vice or preſs: by this means, the ſaw can now be ufed for fawing the pieces into fquares, after they are cut off the tree; and for cutting them up to form different fized blocks, or for fawing up any other timber. The next machine we fhall defcribe is

The great reciprocating Saw, for cutting up trees lengthwife.—In this machine the faw works vertically: it has an horizontal carriage, on which the timber is faftened; this paffes through a vertical frame with grooves, in which another frame flides up and down in the manner of a window-fafh, and has the faw ftretched in it. The faw-frame is moved up and down by means of a crank on an axis beneath the floor, which is turned by means of an endlefs rope. At every time the faw rifes and falls, it turns a ratchet-wheel round, by means of a click, a few teeth; and this has on its axis a pinion, working a rack attached to the carriage of the tree, which by this means is advanced: at every ftroke, the faw makes a proper quantity for another cut. The faw-frame is adapted to hold feveral faws parallel to each other, for fawing a tree into feveral boards at once, when required. Befides thefe machines, the wing contains four of

The circular fawing Benches.—Thefe machines are ufed for cutting the wood ftill fmaller, after the other machines. Thefe machines are a bench, fimilar to a carpenter's, having a fpindle extending acrofs it juft beneath the boards, with a circular faw fixed upon it, which comes up through a crevice in the bench; and as it revolves, the workman applies a piece of wood to it, which it cuts with amazing rapidity. The wood is guided by a long wooden ruler, fixed on the bench, parallel to the plane of the faw. The wood is applied to this guide-ruler when cutting, and this regulates all the wood it cuts to the fame breadth; but the guide-ruler can be quickly adjufted to any diftance from the faw, being attached to the bench by radius bars fimilar to a parallel ruler, fo that it will always be parallel to the faw. We have been thus concife in defcribing thefe circular faws, and the great reciprocating faw, as they are the only machines in the mill which do not fhew a completely original defign, or which have any refemblance to other machinery. The reciprocating faw is fuch as is common on the continent and in America, and the circular faws have been long in ufe in this country. See SAW-*Mill*.

One of the fawing benches is much longer than the others, being continued the whole length of the houfe. It is ufed for fawing the edges of long planks to a ftraight line, after they have been cut up from the trees by the great reciprocating faw. It has a carriage for holding the plank, which is advanced towards the faw by a rack and pinion, which the workman turns by a winch in front of the bench: the plank is held in the carriage by its ends, one end being applied againft a ftop, fimilar to that which a carpenter's bench has for ftopping a piece of wood, while it is planed; the other end of the plank is forced up to this ftop by a fcrew, attached to the carriage, but in fuch a manner that it can readily be fixed at any part of its length, to hold planks of different lengths. The plank, when of great length, is kept down to bed firmly upon the carriage, while it is fawn by a roller, which preffes upon it very near that part of the plank which is paffing the faw. This roller is preffed down on the plank by the weight of a long beam of wood fet up on end, the roller being fitted in the end of it. This beam is fitted, in guides which permit it to rife and fall, to accommodate any inequalities in the thicknefs of the wood or plank which paffes beneath it. This concludes our defcription of the machines in the wing on the ground-floor. The machines contained in the floor over the great fawing machines are devoted to converting or fawing up the tree of lignum vitæ, for the fheaves, and the fmall machines for forming the fheaves. The firft is

The reciprocating Saw for converting the Lignum Vitæ.—This machine is fomewhat fimilar to that firft defcribed for the elm trees, but made on a fmaller fcale and with more accuracy. The faw is ftretched in a wooden frame, which is neceffary, becaufe, being for the hard wood, it is cut with a much finer tooth, and the blade is much thinner, fo that it waftes lefs wood in faw-duft than the former. The tree of lignum vitæ is placed horizontally, being held in a machine, which is, in fact, an enormous vice, though very different in appearance: it is opened and fhut by two fcrews inftead of one, as the common fmith's vice, and thefe fcrews are both moved at the fame time by means of cog-wheels connecting them, fo as to move the jaws of the vice parallel. This machine is ufed for cutting the ends of the tree into flakes of the proper thicknefs, to form thofe fheaves which the diameter of the tree is beft adapted to make with the leaft wafte. The vice which holds the tree is provided with a fcrew, which advances the whole together towards the faw a proper quantity at every time a fheave is cut off, to cut another of the intended thicknefs. For this purpofe, the vice is ftationed upon a carriage fitted upon proper fliders, fo that it advances truly parallel, in order that the pieces it cuts off may have parallel fides. This machine is only ufed for converting the largeft trees of lignum vitæ, which are drawn up to the floor on which thefe machines are fituated by a crane worked by the mill, fo as to occafion little more trouble than if they were upon the ground: the fmaller trees are cut up in a very curious machine.

The circular Saw for converting the Lignum Vitæ.—This operates with a revolving faw, which is applied to the outfide of the tree, which at the fame time turns round to prefent every part of its circumference to the action of the faw. By this means the faw will cut a tree of nearly as great a diameter as itfelf, and make a very flat fection. We have been compelled, from the number of our plates, to omit a drawing of this machine, and muft, therefore, attempt a verbal defcription.

The fpindle of the circular faw is fitted in an iron frame, which moves in a fixed vertical axis, in the manner of a gate or door. The faw fpindle being vertical, the faw itfelf is of courfe horizontal, and its centre defcribes the arc of a circle when fwung upon its axis of motion, but continues in the fame plane. It is turned, like the other machines, by an endlefs band, which is conducted over pullies, on an axis concentric with the axis of motion for the faw-frame; by which means the band continues with the fame degree of tenfion in all pofitions of the frame fupporting it. The vertical axis of this faw-frame is fupported between the points of centre fcrews belonging to an iron ftandard, which is attached to two vertical iron columns, extending from the floor to the ceiling of the room, and which conftitutes the chief framing of the machine. The tree of lignum vitæ, being previoufly cut into lengths of two or two and a half feet, is fixed in a chuck or clam at the top of a vertical fpindle, which is fitted in a focket, in the middle of a crofs-bar, fliding between the two vertical columns. This crofs-bar has two iron rods extending up from it to another fimilar one, alfo fliding between the columns, thefe forming an iron frame which rifes and falls at pleafure, in the manner of a fafh frame, by means of a large fcrew, which is received into a nut, formed in the middle of the upper crofs-bar of the frame. The lower end of the fcrew refts in a ftep in the middle of a fixed crofs-bar extending acrofs from one column to the other, and perforated with two holes for the

iron

iron rods forming the fides of the frame to pafs through as they rife and fall. The fcrew has an iron crofs forming four handles to turn it by, and a ratchet wheel and click to prevent its running back. The chuck or clam at the upper end of the vertical fpindle is of that kind called univerfal, and has two jaws, between which it will hold trees of different dimenfions; but both clams approach or recede from the centre by the fame movement, fo as to keep the tree always nearly in the centre of the vertical axis. It is accomplifhed by fitting both clams in a groove formed acrofs the face of the chuck, and both are moved by one fcrew, one part of which is cut with a left, and the other with a right-handed thread, fo that in turning the fcrew by a wrench, the jaws open or fhut, and the wood can be fixed in with as much eafe as in a vice, but always very nearly in the centre of the chuck. A rotatory motion is communicated to the vertical fpindle by a cog-wheel fitted in a focket made in an iron plate, which is the bafement of the two columns. The centre of this wheel is exactly in the line of the vertical fpindle, which is formed to a fquare, and is received through a fquare hole in the centre of the cog-wheel, but has liberty to flide freely up and down through the wheel. This is turned round by means of a pinion fixed on the lower end of an upright axis, which rifes up a confiderable height by the fide of one of the vertical columns, and has a fmall winch upon the top of it, by which the workman turns it round, and thus caufes the great cog-wheel with the vertical fpindle and wood to revolve at whatever elevation it may be, according to the height the fliding frame is raifed by its fcrew.

The operation of the machine is this; the wood, being fixed at the top of the vertical fpindle, is raifed by turning the great fcrew to fuch a height, that the faw is oppofite that place in the tree where it is intended to be divided. The faw is in conftant motion by the mill, and the attendant preffes it by a lever (fixed to the faw-frame) againft the wood, which it cuts into very rapidly. At the fame time he is doing this, he turns the vertical fpindle (with the wood) round by means of the winch, which communicates with it by the wheelwork, fo that the tree applies all parts of its circumference in fucceffion to the action of the faw, which will by this means cut through a tree nearly twice its own radius, and in confequence of its revolution makes a very flat fection, which will be exactly parallel to the laft it cuts off, fo that the flakes will be of the fame thicknefs in all its parts. When the piece is thus feparated, the workman fwings the faw out of the way of the wood, and turns the fcrew by its crofs handle, to raife up the frame, with the fpindle and tree, the proper quantity to cut off fuch a thicknefs as will form the fheave intended. This quantity is meafured by the fcrew, which, as before ftated, has a ratchet wheel upon it, with a click to prevent it running back, which the weight of the iron frame, fpindle, and wood fupported by it, would otherwife force it to do. The workman counts a certain number of thefe teeth by the noife they make in paffing the click as the meafure of the proper elevation of the wood: by this means the operation proceeds with great rapidity, and another piece is cut off, until the whole length is cut up, when the workman relieves the click and the fcrew runs back, letting down the fpindle ready to receive another length of tree which is cut up in its turn. There are two of thefe machines clofe to each other, one for the larger and the other for fmall trees.

The plates of lignum vitæ, thus cut off the end of the trees, are fawn to a circular figure, and a hole pierced through the centre of each preparatory for turning them by

The Crown or Trepan Saw.—See *Plate* II. *figs.* 1, 2, and 3. *Fig.* 1 is a horizontal fection through the centre of the axis. *Fig.* 2 is an elevation of the whole; and *fig.* 3 an end view. A A is a cylindrical faw with teeth formed upon the end of it, in the manner of a furgeon's trephine, or the crown wheel of a watch. This faw is fixed upon a chuck B, (*fig.* 1.) which is faftened, by fcrewing to the pulley D, turned by an endlefs belt. This pulley and faw are fitted to flip round freely upon a fixed axis or tube E, fupported by being fcrewed to a ftandard F, erected upon the iron frame R R, on which the whole machine is built. G is a ftandard, having a fcrew H through the top of it, and exactly in a line with the centre of the tube E. At the end of it is a cup *h*, which, when advanced by the fcrew, exactly meets the end of the fixed tube E, and between thefe two furfaces, or rings of furfaces, the piece of wood to be rounded is held, by fcrewing the fcrew tight up. The wood is fhewn in a fection at I, *fig.* 1, within the faw. The faw flides backwards and forwards upon the fixed tube E, and can be thus prefented as it revolves againft the piece of wood, to cut through it, and reduce its circumference to a perfect circle of the fize of the interior diameter of the faw. The fixed tube E has a cylindrical fpindle K fitted withinfide of it, which is turned round by a pulley I fixed in the middle of it, and turned round like the other by an endlefs ftrap or belt. This fpindle has a drill fcrewed into the end of it, to perforate the centre hole in the fheave; and it can be moved endways to bring it up to its work in the fame manner as the other. Indeed, it is caufed to advance or retreat at the fame time with it, by means of two connecting rods *b*, *b*, which pafs through holes in the ftandard F, and are at their ends united by fcrews, to collars which are fitted upon fockets, formed in the central part of the pullies D and L, fo that the collars admit the pullies to turn round freely, independent of them; but when either pulley, with its fpindle, is moved endways, it obliges the other to partake of the fame movement. The two collars are fhewn feparately at X and Y, and the ftandard F between them. The farther end of the fpindle K is fupported by a collar in a ftandard M, alfo erected upon the frame R. The motion endways is given to the faw and drill by a lever N, fituated beneath the frame R. The vertical arm *n* of this lever is forked at the upper end, as fhewn feparately at Z, and has notches cut in the extremity of each fork, to receive two pins projecting from the fides of a collar *e*, fitted on the end of the fpindle K, which turns round freely in the collar, but commands the motion of the fpindle endways. The lever N is raifed up, and the fpindle kept back by means of a fpring O fixed to the frame of the machine, fo that when left to itfelf, the faw and drill always retreat back as far as they can. In this ftate the workman takes a piece of the lignum vitæ, which is of an irregular figure, being the fhape of the fection of the tree. This he places againft the end of the fixed tube E, and fcrews it faft by the fcrew H. He now depreffes the handle N, and thus advances the faw and drill, as they are turning all the time, againft the wood, which the former perforates in the centre, while the latter cuts off thofe parts which project beyond the circle, leaving the wood round on the edge and ready for the next operation, which is performed by

The Coaking Engine.—This machine prepares the fheave for the reception of a bell-metal bufh, or centre piece, called the *coak*, one of which is fitted into each fide of the fheave, to furround its centre pin, and avoid wearing. This piece of bell-metal, or coak, is fhewn in *fig.* 9 of the plate: it has a cylindrical part *a*, which paffes through the centre hole of the

the fheave, and has a hole through it for the pin of the fheave. This, which is called its *barrel*, has at the end a fhoulder, or flaunch, of the form of *d*, that is, a circle having three ears projecting from its circumference, which are inlayed into the wood, and thus keeps the coak from turning round in the fheave. This is fhewn at *fig.* 4 of the plate: *e* is a ring of the fame fize and form as the flaunch at the end of the coak: it is inlayed into the other fide of the fheave, but has a large hole through its centre to receive the part, *b*, of the other coak, where it comes through the centre of the fheave. This part being rivetted down into the ring *e*, fecures the two coaks together; but, in fome kind of fheaves, they are further faftened by means of a wire-pin put through the centre of each of the three ears, which is alfo rivetted down. The firft operation which is therefore performed on the fheave, after rounding and centering the wood for it, is cutting a hole, of a proper figure, for the reception of the brafs coak. The engine for performing this is defcribed in the lower part of *Plate* B, of which *fig.* 4 is a front view of it; *fig.* 5, an elevation taken on one fide; *fig.* 6, a plan of the top of the frame; and *fig.* 7, a plan of the lower part where the fheave is fixed. This is, in all the views, marked A: over this a fmall fpindle, B, is fituated; it is mounted in a frame C C, and turned round with great velocity by an endlefs band paffing round its pulley *a*, and conducted over the pullies D, D, *fig.* 5, away to a drum, turned by the mill. The end of the fpindle has a cutter fcrewed into it, fuch as is fhewn feparately at X, formed out of one piece of fteel, with three cutting edges, which cut out a circle of the fize of each of the three ears projecting from the edge of the coak. The frame, C C, of the fpindle is fitted to flide up and down on two vertical rods E, fixed in the framing; and the depth to which it falls is determined by a fmall fcrew *b*, *fig.* 5, on the point of which the frame refts. The fheave, A, is fixed to a chuck F, which has a very fhort axis, received into a focket in the middle of the lever G, attached to the frame by a centre-pin, *e*, at one end, and the other is ufed in the manner of a handle, to move the lever on its centre, and by this means remove the fheave away from the fpindle, fo as to give it any required excentricity from the fpindle; in which cafe, the cutter, X, will cut out a circular hole in the fheave, at any required diftance of the centre thereof. The chuck, on which the fheave is fixed, has three arms, 1, 2, 3, *fig.* 7, projecting at equal diftances from it: thefe are detained at pleafure by a detent *f*, which is forced towards it by a fpring: the frame of the fpindle, when raifed to its greateft elevation, is fufpended by a fpring-catch H; and in this ftate the cutter is raifed up out of the way. The workman now prepares the fheave for coaking, by fixing it on the chuck F. To explain the manner of doing this, fee *fig.* 8, where N is a fcrew paffing down through the centre of the axis and chuck, and has a fcrew cut on the lower end; and by means of a nut M, *figs.* 4 and 5, tapped upon it, the pin can be forcibly drawn down through the axis. The upper end of the pin is, as its figure fhews, of a conical figure, and fills a hole through the centre of a fteel ring O, which is fituated upon the face of the chuck, immediately over its centre. The external diameter of this ring fits the infide of the hole, through the centre of the fheave, which is by this means fixed to the chuck: but to hold it faft thereupon, the ring is divided by a faw into three fegments, and a piece of watch-fpring, P, being put round them, in a groove formed for its reception, keeps the three together, and always collapfes them upon the central pin N; but on turning the nut, M, the pin is drawn down, and its conical head expands the three fegments, fo as to jamb them faft into the infide of the fheave, and by this means fixes it faft. This contrivance of an expanding chuck, which will faften into holes of different fizes, within certain limits, and always preferves its concentricity, is extremely ingenious, and is a very valuable tool for turning many fmall articles in the lathe. The workman thus fixes the fheave to its chuck, to perform which, with convenience, he pulls the end of the lever, G, fo far forwards, that the axis comes as far as it can within the circular frame K, which fupports the machine; but when the fheave is fixed he returns it, fo as to come nearly concentric with the fpindle. This point is determined by fhooting a fmall bolt *g*, *fig.* 4, beneath the lever, G, forwards, and then its end ftops againft the fixed point of an adjufting fcrew *h*. He now, by relieving the fpring-catch H, fuffers the fpindle to defcend till it refts on the point of the ftop-crew *b*. In this ftate, the end of the cutter is as much beneath the furface of the fheave as the thicknefs of the fhoulder *d*, *fig.* 9, of the coak; but the cutter is within the centre hole, at leaft in part, though, in defcending as it revolves, it cuts away the wood, on one fide the hole, as much as will enlarge its diameter on that fide to the fize of the circle of the fhoulder, *d*, of the coak from which the three ears proceed. The workman now draws the handle of the lever, G, away from the fpindle, until the bolt is ftopped againft the point of the oppofite ftop-fcrew *k*, as it appears in *fig.* 7. In this fituation, the fheave is in that pofition, that the cutter is fo far removed from the centre of the fheave, as to cut out the cavity to contain one of the femi-circular ears of the coak. The lever, G, is now preffed againft the other ftop-fcrew *h*; the catch, *f*, is relieved from the arm, *i*, of the chuck, by which it is turned round; and in this motion the cutter enlarges the centre hole to the third of a circle of the proper diameter to receive the coak: when the fucceeding arm, *g*, comes to the detent, he moves the lower, G, out from the centre again to the ftop-fcrew *k*, and thus cuts the fecond ear. The lever is now returned; the chuck turned round; and a third cavity formed in the fame manner as the former; the lever being returned again to the fcrew *h*, the chuck is turned round to where it fet out, and thus completes the enlargement of the centre hole, and the cavity is prepared for the reception of the coak. The fheave, being removed from the chuck, is put on again, with the other fide uppermoft; and to enfure the ears being exactly oppofite to each other on the different fides of the fheave, a fmall button is let into a hole in the face of the chuck, at the fame diftance from the centre as the femicircular ear, and of the fame diameter as that is; being, therefore, of the fame diameter as the cutter, this button is forced upwards by a fpring; but while the firft fide of the fheave was cutting, it was preffed down flufh with the furface of the chuck, and was not in ufe: when the fecond fide is to be cut the fheave is turned round on its centre pin (which is the ring O), before fixing, until the button fprings up into one of the cavities for the ears, and is placed in fuch a part of the chuck, that it determines the pofition of the fheave upon it, fo as to caufe the ears to be oppofite to each other. Being thus fixed, the operation of cutting the fecond fide is exactly the fame as the firft. This coaking engine is a very complete and ingenious machine, and operates in the moft perfect manner to inlay the coaks, and will ferve many different fizes, as will be underftood from its various adjuftments. Thefe are; the ftop-fcrew *h*, which regulates the degree of enlargement the centre hole fhall have to receive the fhoulder of the coak: the fcrew, *k*, determines the diftance of the centre of the ear from the centre of the fheave; the diameter of the ear muft have the cutter *x* fuited to it, for which purpofe it fcrews to the fpindle: and laftly, the fcrew, *b*, governs *b*, governs the depth to which the cavity is excavated, and muſt be equal to the thickneſs of the ſhoulder *d*, *fig.* 9. of the coak. Two coaking machines are uſed at Portſmouth, both effecting the ſame purpoſe as that we have deſcribed, but one of them in its ſtructure differs very materially from our drawing. This is the largeſt machine. The ſpindle of the cutter is fitted in a frame, which is connected by joints with a ſecond frame, having a ſwinging motion on a vertical axis in the manner of a double folding door, or more exactly like the frames of the great circular ſaw firſt deſcribed, if the ſpindle of it was placed vertical inſtead of horizontal; and it receives its circular motion by ſimilar means. This ſpindle has not the power of aſcent and deſcent, but it is evident it can, by the two frames, be moved to any ſpot near the centre of the ſheave that is placed beneath it. The cutter is made to cut out the proper ſhape, by means of a hole cut in a piece of fixed braſs plate, which is of ſuch a figure, that a pin or collar, concentric with the ſpindle, being traced round its interior ſurface, will guide the cutter ſo as to excavate the proper figure in the ſheave, which is fixed on a chuck beneath it, but cannot be turned round, which, from the conſtruction of this machine, is unneceſſary, as the cutter traverſes all the ſpace which is to be cut out, but cannot move any further, being limited by the braſs plate. The chuck for the ſheave is fixed at the top of a frame which riſes and falls with the ſheave, to adjuſt the depth the cutter ſhall cut, and the chuck is let down clear of the end of the cutter every time the ſheave is to be ſhifted. This riſing and falling is performed in a very convenient manner by means of a ſcrew which elevates the frame, and has upon it a barrel, round which two cords are wound in oppoſite directions. Theſe cords are conducted over pullies to two treadles ſituated beneath the frame of the machine, ſo that by preſſing the foot on one treadle, the chuck and ſheave are raiſed up, and by the other, it is let down, and in either caſe the ſcrew retains it where it is placed. The frame is provided with a ſtop-ſcrew, which will determine the height to which it ſhall riſe, and conſequently the depth to which the cutter excavates in the face of the ſheave.

The bell-metal coaks are caſt in ſand, in the manner deſcribed in our article CASTING, from accurate patterns made for the purpoſe, of which they have a great variety of all ſorts for the different ſizes. The pattern, or core, which is inſerted in the ſand for forming the hole through its centre, is not a ſmooth cylinder, but has two projecting threads which encompaſs it ſpirally, in the manner of a very coarſe ſcrew; ſo that when caſt, the interior ſurface of the central hole through the coak is not a ſmooth cylinder, but has two ſpiral cavities, or chambers, winding round within it, in the manner of the ſpiral ſcores within a rifle gun barrel; but theſe cavities do not reach the ends of the hole, which is therefore circular at the two ends. Theſe chambers are intended to contain a ſupply of greaſe to the centre pin, when the block is in uſe, as will be more fully deſcribed.

The coaks, being put into their places, have holes drilled through the centre of each ear, by a very ſimple

Drilling Machine.—This bears a great reſemblance to a common turning lathe, to the ſpindle of which a ſmall drill is fixed, immediately oppoſite to it. In the place of the back puppet of the lathe, is a flat plate or tablet, againſt which the ſheave is placed, and by a ſcrew advanced againſt the drill, which is all the time in rapid motion. The proper place for drilling the hole is determined by marks punched in the pattern from which the coaks are caſt, and thus occaſion ſimilar marks in the centre of each of the ears of every coak, by means of which the drill point is guided to the right place, and quickly penetrates through both the coaks and the ſheave alſo. The pins to fit into theſe holes are made of copper wire, which is chopped or cut into lengths in the moſt expeditious manner by a ſtrong pair of ſhears, having a ſtop or guage fixed at the proper diſtance behind its blade, to ſtop the end of the wire, and point out the proper mark where it is to be cut. Theſe pins are driven into the holes through the ſheave, and in this ſtate the ſheave is ready for rivetting, to faſten the pins in, and to unite the two parts of the coak firmly to each other. This is done by

The Rivetting Hammer.—It is delineated in *figs.* 1, and 2, of *Plate* III.; the firſt an elevation, and the other a plan of the machine. Its frame is a flat iron plate A A, which is ſituated on a ſtrong bench: upon this two ſtandards B, B, are caſt, and ſupport an axis *a*, turned round by means of a belt on the pulley *b*. The other pulley, *c*, is fitted looſely upon the end of the ſpindle *a*, and when the ſtrap is upon it, the machine ſtands ſtill, becauſe the pulley turns round upon its axis. On the middle of this ſpindle is a wheel D, having three cogs, which operate, as it revolves, to lift up the tail of the hammer E, which is fixed upon an axis F, ſupported in the ſame frame, B B, as the main axis. A ſmall anvil or ſtake, G, is fixed to the bottom plate of the frame A, immediately beneath the face of the hammer, and the ſheave, H, is preſented between them to receive the ſtrokes of the hammer, which is lifted by the cogs of the wheel D, and falls upon the ſheave three or four hundred times *per* minute. The hammer would not fall ſo quickly by its own weight, as to reach the ſheave before the next cog of the wheel, D, lifted it up: a ſpring, I, is therefore applied to act beneath the tail of the hammer, and by raiſing it up to throw down the face of the hammer. This ſpring is ſcrewed upon a lever K, which is fixed on an axis, L, extended acroſs the frame, and the other end is ſuſtained by reſting on the ſurface of an excentric circular wheel M, fixed upon an axis, which alſo has a wheel, N, fixed by the ſide of it, and a rope being faſtened round this, deſcends to a treadle beneath the bench, and the workman preſſing this with his foot turns the wheel round, and its excentric circle acts upon the lever, K, to raiſe it up, which cauſes the ſpring to act with greater force, and the hammer to make a more powerful ſtroke. In uſing this machine, the workman takes a ſheave, and, lifting up the hammer, applies it beneath the face of it; then by ſhifting the endleſs ſtrap, which is all the time in motion, upon the live pulley *b*, the axis, *a*, is turned round, and the hammer beats upon the rivets, ſo as to faſten them effectually in a very ſhort time. By this the end of the barrel of one coak is firmly rivetted into the other coak on the oppoſite ſide, and the barrel being, at the ſame time, ſhortened by the rivetting, the ſides of the coak are drawn into their cavities with ſuch force as never to be in danger of getting looſe. Some kinds of ſheaves are found to do as well by merely rivetting down the end of the barrel without uſing any pins: theſe were firſt applied to prevent the poſſibility of any coaks getting looſe; but having been found, in ſome years practice, to be a needleſs precaution, it is accordingly diſcontinued, except in ſome particular inſtances.

Broaching Engine.—The ſheaves, after being coaked and rivetted, are broached, to make the interior ſurface of the centre hole perfectly ſmooth and cylindrical. For this purpoſe, the ſheave is fixed on a flat chuck, at the upper end of a vertical ſpindle, which turns round, and the broach or borer is forced down perpendicularly through the centre hole of the coak, while the ſheave is turning round, boring out the hole as it deſcends to a true cylinder. The manner of fixing the ſheave to the chuck in an expeditious manner, and getting it concentric with the axis, is very well contrived. The vertical ſpindle is hollow for a conſiderable

depth

depth down it, and the borer is a cylindrical rod which exactly fits into this hole in the end of the fpindle, and alfo fits pretty truly into the centre hole of the coak, in the ftate it comes from the rivetting hammer. This cylindrical rod has a fmall tooth of fteel fixed into it, and projecting a fmall diftance from the circumference of the cylindrical rod, which, as before ftated, is of the fame fize as the hole through the coak of the fheave, and its tooth projects as much as the hole is intended to be enlarged in the operation of broaching.

In fixing on the fheaves, the machine being at reft, the broach is drawn up (by the fcrew movement which is ufed to force it down into the fheave), fo as to be clear out of the end of the fpindle: the fheave is then laid upon the flat chuck, at the top end of the fpindle, which is much larger than the fheave itfelf: the cylindrical borer is next put down through the centre of the fheave, and entered into the hole in the end of the fpindle. By this means the fheave is placed on the chuck, exactly in the centre of it, and both being flat, it only requires to be fcrewed or clamped faft againft the chuck, fo as to be turned round at the fame time with it. This is done by a clamp, confifting of an iron ring of a fmaller diameter than the fheave, having two fhort bars projecting from the oppofite fides of it. Thefe bars extend acrofs the face of the chuck, to which one of them is connected by a joint or hinge, and the other by a fcrew; or, in other words, the clamp may be confidered as one bar, having a large hole through the middle of it, one end being hinged to the chuck, and the other drawn towards it by a fcrew fimilar to a vice fcrew; but is fo conftructed as to be quickly unhooked, and then the clamp bar may be lifted up upon its joint, in the manner of a book lid, to place the fheave under it. The ring or hole through the centre of the clamp, when fcrewed down upon the chuck, is concentric with the fpindle, and thus leaves the centre of the fheave free and clear for the operation of the borer. The fheave is thus, by means of this clamp, faftened down upon the face of the chuck in a moment, and the workman fets the machine in motion. He now, by turning a handle, gives motion to a wheel over head, in the centre of which is a nut, through which the fcrew in a line with the borer is fitted to work; and this fcrew as well as the borer being prevented from turning round by appropriate fitting at the end of it, is caufed to defcend, and force the borer down till its cutting tooth meets the bell-metal coak, and cuts its way through, enlarging the hole to its intended dimenfions, and making it truly cylindrical to fit the pin on which it will turn when in the block. It is to be obferved, that the interior furface of the hole has two fpiral grooves or cavities withinfide it, which are formed in the cafting, as before defcribed. Thefe are too deep to be taken out in the broaching, and form receptacles for greafe, which is thus always kept fupplied to the centre pin, both to diminifh friction and avoid wear of the parts. This is a great improvement in the blocks, as, without fuch receptacles, the pin, if well fitted into its centre hole, as it is and fhould be, would afford no room for greafe, and then the block would require conftant attention to keep it fupplied, or would always be in want of it. The two fpiral cavities do not come to the ends of the hole in the coak, which is therefore a complete circle. By this means, when the pin is in its place, the cavities have no external communication at which the greafe can efcape.

The Face-turning Lathe.—The fheaves in this ftate are turned to make the two faces perfectly fmooth, and the circumference truly circular, as well as to form the groove or hollow round the edge of it, to receive the rope. The turning is performed in a very complete lathe adapted for the purpofe, fee *Plate* III. *figs.* 3, 4, 5, 6, and 7. *Fig.* 3 is an elevation, and *fig.* 4 an end view; *fig.* 5 is an horizontal plan, and *fig.* 6 are various parts fhewn feparately; *fig.* 7 is a crofs fection anfwering to *fig.* 4. A is the fpindle or mandril of the lathe, mounted in the ufual ftyle between two ftandards B, C, which are erected upon the main frame or bed D of the machine: it is turned round by an endlefs band on the pulley E, and F is an idle or dead pulley, on which the band is fhifted when the lathe is intended to be at reft, becaufe it turns freely round upon the axis without moving it. On the end of the fpindle a chuck, G, is fcrewed, to which the fheave, H, is fixed by means of an expanding ring chuck, fuch as defcribed belonging to the coaking engine, except that the fcrew, N, is tapped into the chuck G, inftead of having a nut behind it in the manner of the coaking engine, and this fcrew is turned with a fcrew driver, which has a fquare end, and the end of the fcrew has a fquare hole to receive it. The tool *a*, which cuts or turns the face of the fheave, is carried in a ftraight line acrofs it, from the centre to the circumference by a fliding reft, which confifts of two fliders placed acrofs each other. One is fixed faft down upon the frame of the lathe at I, and has a metal frame, K, fitted acrofs it, which flides upon it by means of two parallel pieces *k*, *k*, which are attached to it on the lower fide, and fit upon the dovetailed edges of the lower flider I. A fcrew, the handle of which is fhewn at M, is fitted within the lower flider, and operates by a nut fixed beneath the frame K. To move it along the flider I, when the fcrew is turned by the handle, M, upon the end of it; the frame, K, has two pieces or rulers *n*, *n*, fcrewed down upon it, forming a dovetail groove, in which a flider, N, is fitted and moved in a direction acrofs the frame by a fcrew L, which is alfo provided with its handle P. This laft flider has a frame Q, erected upon it, in the top of which is a groove, to receive the tool *a*, and a piece of metal, *b*, covers it, and can be drawn down upon it by means of a fcrew, fo as to form a clamp which holds the tool down firmly upon the flider. The handle, P, of the fcrew, L, is only ufed occafionally, to traverfe the tool acrofs the face of the fheave; it is in general moved by means of a pulley O, fitted to flip round freely thereon. This pulley is turned round by means of an endlefs band *d*, which makes a turn round the pulley *e*, and then paffes away and goes round a pulley R, which is fixed on the extreme end of a fpindle S, mounted in a frame T, fixed perpendicularly acrofs the great frame D D. This fpindle has a wheel, V, fixed upon it, having fine teeth formed round the edge of it, which are engaged with the threads of an endlefs fcrew W, cut upon the main fpindle A. By this means the pulley, R, receives a flow motion from the main axis, and by means of the endlefs band, communicates a ftill flower movement to the pulley O. The band, after having made the turn round this, is conducted round a pulley *e*, which is fixed at the upper end of a flexible fpring X, attached to the legs of the frame, and thus preferving a proper tenfion of the band, though the fituation of the pulley, O, is conftantly altering the pofition of its centre by the movement of the flider N, and its frame, K, upon the lower flider, I, by the fcrew M. The manner of ufing the machine is this: the fheave is attached to the chuck by a turn of the fcrew N, in the centre of the expanding fteel ring, as before defcribed of the coaking engine, and the direction of the fpindles movement is fuch, that the drift of the work always makes the chuck tighter, by working the fcrew farther in and expanding the ring more powerfully into the hole in the centre of the coak, to make it turn the fheave about with the chuck. Being thus prepared, the ftrap is fhifted to the live pulley E, and caufes the fpindle to revolve and the fheave with it: the ſcrew, L, is turned by its handle P, to bring the point of the tool oppoſite the centre of the ſheave: the ſcrew of the lower ſlider is now turned by its handle M, to advance the point of the tool, to touch the face of the ſheave as it revolves, and then the ſcrew, P, is put in motion by this means. The pulley, O, is, as before ſtated, in conſtant motion, but ſlips upon the end of the ſcrew. This, at a ſhort diſtance from the pulley, is formed into a ſquare, and has a clutch or ſhort lever fitted upon it, ſuch as is ſhewn at Y, *fig.* 3. This has a center-piece or ſocket, having a groove formed round it for the reception of pins attached to a forked lever Y, *fig.* 5, in the manner ſhewn at Z. This admits the clutch to turn round freely within the fork, but is obliged to move an end upon the ſpindle, to draw it away from the pulley O; and in this ſtate the pulley ſlips round: but when the lever is moved to thruſt the clutch towards the pulley, a pin projecting from it intercepts the arm or lever of the clutch, and turns the ſcrew round with it. In this ſtate the ſlider, N, traverſes ſlowly along, and the point of the tool, *a*, advances from the centre of the ſheave to the circumference, turning the face of it all the way perfectly ſmooth and true; to prevent the ſcrew forcing the ſlider, N, too far, and injuring or breaking it, a rod, *z*, is provided, which is jointed to the end of the lever *y*, and is received through an eye, *x*, attached to the ſlider N. The rod ſlides freely through this eye; but by the time the tool has arrived at the circumference of the ſheave, the eye, *x*, has intercepted a nut, *p*, at the end of the rod, and drawing it, removes the lever *y*, and by this means diſengages the ſcrew from the connection with the pulley Q, and thus prevents the danger of breaking the ſcrew: for as ſoon as the ſlider arrives at the end of its motion, the ſcrew is diſengaged, and its motion ceaſes.

The groove round the edge of the pulley is turned, at the ſame time the tool is turning the face of the ſheave, by a gouge which the workman holds over the edge or reſt, marked &, which is fixed oppoſite the edge of the ſheave, in the manner repreſented in *fig.* 7, though it is omitted in the other figures. This part of the turning is performed in the uſual manner of turning by hand; and the workman has plenty of time to do it, whilſt the machine is turning the face of the ſheave, which it does without any attention on the part of the workman, except at the firſt ſetting out, when he has a little trifle to perform: this is, as ſoon as the tool has advanced acroſs the face of the metal coak, (and therefore finiſhed the turning of it,) to double the velocity of the machine; for it is found by experience, that the proceſs of turning will be performed to the greateſt advantage, when the work revolves with a certain velocity for braſs or bell-metal; but in turning wood, it is proper to move nearly twice as quick, being a ſofter ſubſtance, and not liable to heat and ſoften the edge of the tool, as metal would, if turned with the ſame velocity. The change of ſpeed in the machine before us, is effected by the wheel which gives motion to the ſtrap, turning the ſpindle of the lathe: it has another wheel ſituated cloſe to it, upon the ſame ſpindle, but revolving with twice the velocity of the other. They are ſo near each other, in the ſame manner as the live and dead pulley upon the ſpindle A, that the ſtrap can readily be ſhifted from one to the other while they are at work. Thus, when the machine is firſt ſet in motion, and as long as the tool continues turning the bell-metal, the ſtrap is upon the ſlow pulley; but as ſoon as the workman ſees the tool is beginning to cut the wood, he ſhifts the ſtrap upon the quick pulley, by which its velocity, and conſequently that of the lathe, is immediately doubled, and continues ſo until the ſheave is finiſhed turning; and then the workman returns it back again to the ſlow pulley, and immediately after ſhifts the ſtrap to the idle pulley upon the ſpindle A, which ſlips round upon it, and the motion ceaſes. The ſlider, I, is not fixed to the frame. D D, in a direction perfectly parallel to the ſpindle, and therefore the ſlider, N, is not exactly perpendicular to it, by which means it gives a convex ſurface to the ſheave; and when it is fitted into its block, it will be certain to touch it only in the centre, and thus avoid all unneceſſary friction. The chuck G, as ſhewn by its ſection in *fig.* 3, is turned hollow, and the ſheave only applies to a prominent edge at the circumference of it, by which means it will receive the convex ſurface, when the ſecond ſide is to be turned, as readily as it did the flat ſurface, when the firſt ſide was turned. The angle of inclination of the ſlider is very trifling, becauſe the ſheave is not required to be very convex; and this convexity will be double the angle the ſlider, I, makes with the ſpindle, or, what is the ſame thing, the difference of the other ſlider from the perpendicular to the ſpindle. The ſcrews which faſten the ſlider, I, down upon the main frame D, are adjuſtable to increaſe or diminiſh the convexity at pleaſure.

The turning duſt, which this machine makes, is winnowed in a machine, ſimilar to that uſed in corn-mills, to ſeparate the wood-chips from the metal-turnings, which are returned to the foundery to be re-melted, and uſed in caſting other coaks.

This machine completes the ſuite for making the ſheaves. All the machines we have deſcribed diſplay great ingenuity, and much originality of thought, particularly the expanding chuck for holding the ſheaves in the coaking and turning machines. Among all the multitude of ingenious tools, uſed by turners for chucking or fixing their various works in the lathe, nothing was completely adapted to the circumſtances of the preſent caſe: for as the coak is to be turned to the very centre, and the ſheave all acroſs the face, and alſo upon its circumference at the ſame time, ſo that nothing elſe than holding it by the inſide of the centre hole would ſucceed. It is a valuable tool for many other ſimilar uſes. The converting machine, or circular ſawing machine, is extremely well adapted to its purpoſe; and the contrivance of turning the log round, while it is ſawing, is moſt excellent, as it enſures a perfect flat ſurface, and parallel to the former cut; conditions which would be extremely difficult to fulfil in any other manner. Indeed the great reciprocating ſaw is not found to be at all equal to it, and is therefore never uſed, except for ſuch large trees as the circular ſaws cannot cut through: it would have been unwieldy to have made ſo large a machine on the conſtruction we have deſcribed for the circular ſaw, many of the trees being eighteen inches and more in diameter. The whole ſeries are calculated for operating upon large or ſmall work; and this is one of the greateſt merits of the machines. More than 100 ſizes of ſheaves are made by them, of all diameters and all thickneſſes. It will be proper for us to review all the ſuite, and point out the means by which they are adapted to the different ſizes. In the firſt converting or ſawing machine, the number of teeth of the ratchet wheel on the ſcrew, which the workman paſſes every time, regulates the thickneſs of the ſheave, and this very accurately; for the ſcrew is cut with a coarſe or rapid thread, and the ratchet wheel having ſeveral teeth, it gives the means, by counting one tooth more or leſs, to cut them with the greateſt preciſion to any thickneſs required.

In the rounding and centering machine, the chuck of the trepan ſaw is ſcrewed to the ſpindle, in the ſame manner as a lathe chuck, and can readily be removed, and another of any ſize ſubſtituted, for the different ſizes of ſheaves: the drill in the central axis alſo ſcrews into it, and a great variety

 variety

riety of all ſizes are provided. The whole of this machine is very ingenious and expeditious in its operation.

The coaking machine is univerſal, and will cut any ſize, as we have before deſcribed. The coaks are caſt from a great variety of patterns, ſuited to the various ſizes.

The rivetting hammer, having no parts which are attached to the ſheave, will of courſe apply to any thickneſs indifferently.

The broaching engine holds any ſized ſheave, and the clamp which faſtens them to the chuck adjuſts to different thickneſſes: the borer or broach is eaſily changed for any ſize; it is, as before ſtated, a cylindrical rod of the ſize to fit the centre of the rough coak, and its cutter projects enough from it to clear the hole out.

The facing lathe is provided with a variety of expanding chucks, like the coaking machine, and adapted to all ſizes. They are put on by merely removing the conical ſcrew in the centre of the chuck, and putting in another ring around it; the lower ſlider accommodates for different thickneſſes of ſheaves, and the common turning reſt, *fig.* 7, for the different diameters.

This operation finiſhes the ſheaves, which are now ready to be fitted into their ſhells or blocks, the manner of forming which we have yet to explain; but we ſhall firſt notice the machines for making the iron pins, ſituated in a ſmall room up ſtairs. Theſe are of two kinds: firſt for turning, and others for poliſhing or burniſhing them afterwards. The pins are forged between ſwages, by two workmen, in the uſual manner of ſuch articles, and are cylindrical, except a ſmall part at one end, which is left ſquare, to be inſerted into the cheeks of the block, that the pin may not turn round when it is put together, by the friction of the ſheave upon its pin.

Pin-turning Lathe.—The lathes for turning the iron pins are the beſt finiſhed machines of the whole ſuite, being the laſt which are made, and by no means the leaſt important in their uſe, as they turn the largeſt iron pins, perfectly cylindrical, from end to end in a very ſhort time, and without attendance, except at firſt; an operation which is very tedious and laborious, when performed, in the uſual manner, by hand. We ſhall be able to give a tolerable idea of this machine without a drawing on purpoſe, it being compounded of the parts of many machines we have deſcribed in our different plates. The reader muſt ſuppoſe a lathe with a triangular bar, in its form ſimilar to that deſcribed in our article LATHE, but its reſt removed from the bar. This is to be fixed over a ſtrong ſquare iron frame, but the puppets of the lathe not vertical; that is, a perpendicular line let fall from the central line of the mandril, will fall clear before the triangular bar, one ſide of which is upright. This is neceſſary, becauſe water is uſed to drop upon the turning tool; and if it fell upon the bar, it would cauſe it to ruſt and ſpoil the fittings. The ſquare iron frame, over which this lathe is fixed, has on one of its ſides a long ſliding reſt, which is in its properties ſimilar to that belonging to the face-turning lathe, except that its long ſlider is parallel to the direction of the mandril; the tool being ſupported by a ſmaller ſlider perpendicular to this, and moving along upon the long ſlider by a long ſcrew, which can occaſionally be turned by a motion from the mandril, or may be turned by a handle. The tool itſelf is a cylinder of ſteel, cut off obliquely, ſo as to preſent an elliptic face, the ſmall end of which is the cutting edge; it is held in a holder at the end of the ſmall ſlider, of ſimilar form to that uſed for the ſhaping engine, as will be particularly deſcribed hereafter. The lower or long ſlider, which, as before mentioned, is parallel to, and as long as the lathe, conſiſts of a rectangular frame (or it may be conſidered as a large flat bar, with an opening or mortiſe through its upper ſide, and extending its whole length, giving it the appearance of a frame), and in this the ſcrew is fitted. On the upper ſurface of the frame two rulers are ſcrewed at the ſides, forming between them a dove-tailed groove reaching the whole length of the frame, and in this groove a ſmall flat plate is fitted, and traverſes, by the action of the long ſcrew, from one end of the lathe to the other. The flat ſliding plate has a cap-piece or ſocket ſcrewed down upon it, forming between them a ſocket for the reception of a ſhort triangular bar or priſm, which is the upper ſlider carrying the tool, and traverſes through this ſocket in a direction perpendicular to the former ſlider; it therefore advances or recedes directly to and from the pin which is turning in the lathe. The end of the triangular ſlider has a ſocket or holder in it, which holds the tool in an inclining poſition, a little removed from the vertical, in the manner of the ſhaping engine: the ſlider has a ſcrew behind it to force it forwards towards the work: the flat plate, which moves in the groove of the lower ſlider, has an iron arm proceeding from it, which turns upward behind the pin in the lathe, and has a little table on the top of it, to ſupport a ſmall veſſel of water, which ſupplies a ſmall ſtream to drop upon the turning tool. The ſcrew of the long ſlider has a ſmall wheel fixed on the end of it, which is turned by an endleſs ſcrew formed on the end of a ſmall ſpindle, perpendicular to the direction of the lathe, and is turned by a band, which receives its motion from pullies on the mandril of the lathe. The pivot of the ſpindle of this endleſs ſcrew is fixed in a piece of metal which moves on a centre, to allow the ſcrew to fall down clear of the teeth of the wheel; but when the ſcrew is engaged with the wheel, the piece ſupporting its pivot is kept up by a catch, which is provided with a rod, in the ſame manner as the facing lathe: this diſengages the catch, and conſequently, by letting fall the endleſs ſcrew, diſengages the motion of the long ſcrew, when it has turned the length of the intended pin, ſo as to avoid the danger of injuring the machine. The pin is, as before ſtated, forged with a ſquare part at one end: this ſquare end is received into a chuck ſcrewed to the end of the mandril, the form of which is an hollow ſquare priſm; but two of its oppoſite angles are cut clear away, ſo that it catches the pin by only two of the angles of its ſquare, and by being forced deeper into the priſm, it is ſure to fit and hold it correctly by theſe two angles, and with leſs danger of altering its poſition, than if there were four angles to the chuck, being certain of a correct bearing. The pin is prepared for turning by a ſmall hole being punched in the cylindric end of it, a ſimple tool being uſed to enſure the punch being ſet truly in the centre of the end of the pin. The operation of this turning lathe is thus: ſuppoſe the motion caſt off, and the wheel-work of the long ſcrew diſengaged, the tool is moved by turning this ſcrew with its handle to ſtand at that end of the long ſlider which is fartheſt removed from the mandril. The pin is now put in, by inſerting its ſquare end into the chuck, and ſcrewing the back centre into the hole punched in the other end of the pin, which being thus mounted, the lathe is put in motion, and the tool advanced, by the ſcrew of the upper ſlider, towards the pin, until its edge meets it, and cutting it as it turns round to a true circle juſt at the end. Being thus ſet in, the wheel at the end of the ſcrew of the long ſlider is, as before deſcribed, engaged with the wheel-work which gives it motion, and this traverſes the tool from one end of the ſlider to the other, cutting a thick ſhaving off the pin, and turning it cylindrical in its whole length; the ſmall veſſel of water

 before

before mentioned being attached to the focket for the flider carrying the tool, therefore moves along with it all the way. This cock is fet to drop a fmall ftream of cold water on the tool to keep it cool; but the water falls, together with the fhavings, clear down through the iron frame, and is caught in a ciftern below. The motion of the tool, when it arrives at the intended length of the pin, cafts itfelf off, as before ftated, fo as to be in no danger of breaking the flider or fcrew. Three of thefe machines are in conftant ufe for different fized pins After being turned, the pins are truly cylindrical and ftraight, but have fpiral lines or fcratches traced upon them, in confequence of the edge of the tool not being always perfectly keen. To remove thefe, and make them perfect, the pins are burnifhed in

The Polifhing Machine.—This confifts of three fteel dies fixed in a box, and regulated by ftrong fcrews to form a triangular opening of any required dimenfions. The pin being drawn through thefe dies, and turned round at the fame time, receives a moft violent preffure and friction, which burnifhes and polifhes the whole of its furface in the moft perfect manner imaginable. The dies are of courfe immerfed in oil, to avoid the heating of the pin or dies from the friction. This is the general conftruction of the machine: the pin is faftened, by means of a ftrong hand vice, to the lower end of a long fcrew, with which it forms a right line: this fcrew and pin are placed in a vertical pofition exactly over the dies, and the fcrew is enclofed in a nut or female fcrew, which is made in two halves, and fhuts up in the manner of a pair of tongs round the fcrew, fo that they can be opened, and then the fcrew can be raifed or lowered at pleafure, it being properly balanced and fufpended by tackle, which gives the means of lifting it with eafe. Exactly beneath the fcrew the dies are fixed, being fitted into an iron frame or box containing the three, each fitted into a proper groove, and adjuftable by a fcrew behind it, to form a triangle of fuch dimenfions as the pin will exactly fill. The interior furfaces of thefe dies are highly polifhed, and as hard as fteel can be made. The box or frame for the dies is contained in a pan which is filled with oil, and has a vertical tube beneath it, to admit the pin to defcend into as it paffes through the dies. To prevent this tube and pan overflowing by the immerfion of a large pin, a copper pipe proceeds from the vertical tube, and communicates with a large pan, fixed at a little diftance behind the dies, and on the fame level with the pan which furrounds them. By means of this communication, the united furfaces of the two pans are fo large, as not to be materially raifed by the immerfion of a pin.

In the operation of this machine, fuppofe the fcrew at the top of its movement, the pin is faftened to it by the vice at the lower end, biting the fquare end of the pin. One of the fcrews of the dies is now fcrewed back, and this opens or enlarges the triangle between them, that the pin may pafs clear through it without forcing. The nut at the top of the fcrew is now opened, and the pin let down till its fquare end comes to the dies. The fcrew of the die is now fcrewed up hard to bite the pin; and the nut is clofed round upon the fcrew. The machine is now put in motion, and the fcrew being turned by it turns the pin round, and at the fame time draws it up through the dies, which burnifh the furface in the moft perfect manner; and when they come out, have as high a polifh as it is poffible for iron to bear, and the furface receives a kind of cafe-hardening, which enables them to refift wear in a moft effectual manner. It is found to facilitate the procefs of polifhing, to rub the pin over with foap before it is put in, as this prevents any danger of the pin having fpecks in it which are not perfectly polifhed, owing to fome properties in that part of the iron which caufe the dies to abrade or rub up the furface of the iron rather than burnifh it down to a polifh; but the ufe of a flight quantity of foap is found to render the procefs certain.

Machines for making the Shells of the Blocks.—We have now to notice thofe machines which are devoted to the fabrication of the fhells for the blocks: they are, as before ftated, contained in the central building of the mill, in the roof of which is the fhaft that drums upon it, giving motion to the whole, with very convenient contrivances for detaching any movement at pleafure. This fuite of machines, perhaps, difplays the greateft ingenuity, or at leaft the greateft novelty, of any in the whole work; feveral of the operations, particularly the mortifing and fhaping, being new principles of working wood by machinery, and are valuable inventions, being applicable to many other ufeful purpofes, when wood is to be formed into fmall articles, of which a great number are required of the fame kind.—The firft operation to which the blocks of wood intended to form the different fhells are fubjected to, is boring in the

Boring Machine.—The pieces of elm to form the different blocks being prepared, and converted to the proper dimenfion by the fawing machines firft defcribed, have two holes perforated through each in different directions; one through the centre of each, which is intended to receive a centre pin from the fheave, and as many others as the block is intended to have fheaves in a direction perpendicular to the former, being intended as the commencement of the feveral mortifes which are to contain the fheaves. *Figs.* 1 and 2 of *Plate* IV. are elevations of this machine, *fig.* 3 an end fcrew of one fpindle, *fig.* 4 is a detached view of fome part, and *fig.* 5 is a plan of the whole machine, the fame letters of reference being every where ufed. A, B, reprefent two fpindles turned by their refpective pullies *a*, *b*, and mounted in a frame fimilar to the mandril of a lathe; both are provided with borers C, D, formed to edges in the manner of a carpenter's centre bit. The block marked X is held in an iron frame, E L L, by the end of a fcrew, F, being forced down upon the top of it, and the borers are prefented to it by the action of two levers *g* G *k* and *h* H *i*, which move on centre pins fixed in the frame of the machine at *g* and *h* (but at different heights from the frame, as is fhewn in *fig.* 6.) Thefe levers act upon pins fixed in the frames of the two fpindles, which frames are fitted upon dovetailed fliders I and K, fo that they advance towards the block when the workman moves the handles, *i*, *k*, at the ends of the levers in that direction; and the borers, being in rapid motion by their pullies, penetrate the wood very quickly. The proper fituation for fixing the block, that the borers may enter at the proper points, is determined in this manner: the frame E L, as the plan fhews, confifts of three legs rifing from the main frame, and uniting together to fupport the focket in which the fcrew, F, acts. Two of thefe legs unite together before they reach the focket. (See L, *fig.* 2; and L L, *figs.* 1 and 5.) In this double leg three fmall fcrews, *d*, *e*, *f*, are inferted, their heads forming a fupport, againft which one fide of the block is firmly held, before the fcrew, F, is fcrewed down upon it, and holds it faft upon the head of a fcrew K, which is the fupport of the block. But thefe three fcrews only determine the pofition with refpect to the borer D; and that it fhall pierce it perpendicularly to the fide of the block, the borer, C, is caufed to penetrate the centre of the block by a gauge, formed out of a piece of iron, fhewn feparate in *fig.* 4. It has a groove in it, through which the fcrew, K, paffes to fix it down to the

the frame, and a blade, R, ftanding up perpendicular, juft beneath the borer D, *fig.* 1, as fhewn there at R. One fide of the block being preffed in contact with this blade, while the other fide is held againft the heads of the three fcrews, determines its fituation, fo that the borers will form the holes in the exact points required, and which being adjufted by experiments for one block, will bore any number of the fame fize in the fame places. The adjuftment for blocks of different thickneffes, is made by the three fcrews, *d*, *e*, *f*, being fcrewed to project more or lefs from the frame, that when the fide of the block is applied to their heads, the borer, D, will perforate the block in the middle of its width, and perpendicular thereto.—In the fame manner, by the gauge, R, being fixed a greater or lefs diftance from the fcrew K, the borer, C, may be adjufted to bore exactly through the centre of the fide it is prefented to. The lengths of different fized blocks is accounted for by putting collets of different thickneffes beneath the head of the fcrew K, which raifes the fupport for the block to the proper height. The flider, I, on which the frame of the fpindle, A, moves, is firmly fixed down upon the frame of the machine, but the flider, K, for the other fpindle is formed on the top of a frame S S, which has a motion on an axis formed by the points of two fcrews, T, T, paffing through ftuds projecting from the frame. This frame, and the flider it fupports, can be rendered immoveable at pleafure, by the points of two ftop-fcrews *m* and *n*, which may be alfo fet to allow it any required latitude of motion. In the former cafe, when the frame is fixed ftationary, as we have confidered it in what we have before ftated, the machine is adapted for boring fingle fheaved blocks, the borer, D, perforating the block in the centre. When double blocks are to be bored, the points of the ftop-fcrews *m* and *n* are fet at a proper diftance afunder, and the frame, being held firft to one of them, bores a hole for one fheave, and being then turned over to the oppofite ftop-fcrew, formed a fecond hole at a proper diftance from the firft. The difference of height between the two borers is rather more than the femidiameter of the fheave, becaufe one is level with the centre, and the other, D, is by the end of the mortife, to adjuft this difference for the different diameters of blocks; the frame, S S, has feveral holes in its fides, at fmall diftances apart, to receive the points of the fcrews T, T, and the frame, being pitched on any of thefe different centres, will raife or deprefs the point of the borer, D, to the proper height for the different fized blocks. The fcrew, F, has a lever N, fixed upon the top of it, and loaded at the ends with two weights, in the manner of the fly prefs, and the block being, as before-mentioned, held in its true pofition, the fcrew is forced fmartly down upon it, and by the momentum of the balls preffes very powerfully upon the wood. The fcrew is provided with a fteel ring, fitted upon its point, which has a fharp edge beneath, and this penetrates the end of the block, deeply marking a ring round in it, which is exactly in the centre of the end, and is ufed to fix the block in a proper pofition in fome of the fucceeding machines. The blocks, being thus bored, are fubjected to the action of

The Mortifing Machine, which cuts out the mortifes for the reception of the fheaves. It is delineated in *Plate* V. where *fig* 3 is an elevation in front, and *fig.* 5 a vertical fection of the lower parts taken parallel to the former; *fig* 1 a horizontal plan, as is alfo *fig.* 4 at a different level; *fig.* 3 is an elevation of the whole machine. The machine works as many chiffels as the block is to have fheaves; thefe, as fhewn at A, *figs.* 2 and 3, are attached to a frame B *a a k*, which rifes and falls with great velocity, forcing the chiffels through the block X, fixed in a carriage C D, which advances after every cut the chiffels have made, the thicknefs of the chip, it is intended to cut out of the end of the mortife at the next ftroke. But this advancing movement of the carriage ceafes as foon as the mortife is enlarged to its proper length. The reciprocating motion of the frame for the chiffel is occafioned by a crank *d*, on the end of the main axis E, which is fupported in bearings at each end, one in a crofs-bar, F, of the frame, and the other in a ftandard G, which is erected from the caft iron ground fill, which is the foundation of this whole machine. The axis has a rapid rotatory motion communicated to it by an endlefs ftrap, encompaffing the pulley H, and the velocity of the motion is regulated by the fly-wheel I. The crank, *d*, has a fpear or connecting rod, K, jointed to it, and connected by a joint at the upper end with the fliding frame B, which is formed to a triangle at top, and has a cylindrical rod, *k*, rifing from its vertex, and accurately fitted into a focket, fupported by framing, erected on the top of the main columns which form the framing. The fides of the lower part of the frame, B *a a*, are formed into dovetail fliders, and received into grooves in the edges of metal bars *b*, *b*, *fig.* 3, attached by fcrews to the vertical pillars of the frame. By this means the frame flides freely up and down, without being capable of any deviation from the perpendicular, and the chiffel, being firmly fixed to it, moves in the fame manner when they defcend into the mortife. The frame has two bars, *a*, *a*, acrofs it, againft which the chiffels, A, A, are held, by means of a clamp provided to each, which lies behind the bars, and its two ends, *z*, *z*, come over them in front, with holes to receive the chiffels and fcrews to faften them. By means of thefe fcrews, the chiffels are preffed forcibly againft the bars, and attached to the frame, but in fuch a manner that they can be fixed at any diftance afunder, or any number may be put on at pleafure, by their refpective clamps, to mortife either fingle, double, or threefold blocks. The carriage C D, in which the blocks are fixed, is an iron frame, fliding on proper bearing in the main frame, and the advancing movement is communicated to it by means of a fcrew L, fitted through a nut in the centre of the ratchet wheel M, which turns round in a focket, formed in a crofs bar, N, of the framing: thus, when the wheel is turned round, it operates upon the fcrew to advance it, with the carriage and block at the fame time: the ratchet wheel is turned round at intervals, by means of a tooth, formed in a rod *e*, *fig.* 5, attached by a joint to the end of a bent lever O, which receives its motion by the other end of the lever, having a roller *g*, which applies itfelf to the circumference of an excentric circle or camm, *h*, fixed on the main axis E. By this means, at every revolution of the main axis, the rod, *e*, moves backwards and forwards, and in the period when the chiffels are nearly at the height of their afcent, the tooth of the pall or rod, *e*, turns the ratchet wheel one tooth, and by the fcrew, L, advances the carriage and block the thicknefs of the chip, the chiffels are intended to cut from the end of the mortife, at the fucceeding ftroke. The ratchet wheel, M, has a cog-wheel, P, fixed to it, which has its teeth engaged by a fmaller cog-wheel Q, fixed on a long fpindle R, extending to the front of the machine, and has a handle, S, fixed upon it, by means of which the workman can, at any time, turn the wheel round fo as to bring the carriage to the proper point for the commencement of the mortife. The motion of the fcrew is caft off at the proper time by this means; the rod is fupported at its extremity, by refting upon the extremity of a lever *n*, the oppofite end of which is moveable on a centre pin fixed in the column of the frame. This lever is fupported by a fecond lever *i*, moving on a centre in a fmall ftandard erected

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for it. The oppofite end, *o*, of this lever is loaded with a heavy end, that will overbalance the lever, *n*, and rod *e*, and lift them up, fo that the tooth of *e* paffes clear over the teeth of the ratchet wheel, without interfering with them, and in this ftate the carriage is at reft. The end, *o*, of the lever *i o*, when the machine is mortifing, is fupported upon a ruler of iron *p*, *fig.* 3, which is faftened by fcrews to the fide of the carriage C D. This fuffers the rod, *e*, to defcend fo low, that its tooth turns the wheel round at every revolution, and advances the carriage; but when it has proceeded the length of the intended mortife, the ruler gets beyond the heavy end of the lever *n o*, which drops down and relieves the fcrew from any farther motion, fo that there is no danger of cutting the mortife longer than is proper.

A very ingenious part of this machine is the contrivance for giving it motion or ftopping it at pleafure. The fly-wheel I, and alfo the pulley, H, for the ftrap, are fitted upon a round part of the main axis E, fo as to flip round freely thereon, when the machine is to be at reft. When it is to be worked, the pulley and its axis are united by a wheel R, *fig.* 1, fitted on the axis by means of fillets, fo that it is conftrained to turn round with the axis, but has liberty of fliding along it. The latter motion is given to it by a lever, V, extending acrofs the frame, to which it is connected at one end by a centre pin, and in the middle it has an aperture large enough to receive the centre piece of the wheel R, in which a groove is turned to admit the points of two fcrews *v*, *v*, which operating in the fides of the groove, confine the wheel endways upon its axis; but the wheel turns round without interference with the lever. The wheel, R, is formed conical upon its edges, and can be by the lever, &c. jambed to fit in a fimilar cone formed withinfide the pulley H. In this ftate, the friction of the two conical furfaces is fufficient to turn the machine; but when the wheel, R, is drawn back on the axis, fo that its conical edge is difengaged from the conical cavity formed within the pulley H, the fly-wheel flips upon the axis at the fame time the cone on the back of the wheel, R, is jambed into an iron ring, W, firmly fixed to the frame. It is formed conical withinfide, in the fame manner as the infide of the pulley H, and when the wheel is jambed into it, fixes the axis motionlefs. This is a very proper provifion, as the friction of the fly-wheel running fo quickly upon its axis, when it is caft off, might be fufficient to move the machine flowly, and the momentum it acquires would, in addition to this, keep it in motion for fome time; but the conical wheel being jambed in the fixed ring, W, as foon as it is withdrawn from the pulley, deftroys the motion of the machine at once.

The chiffels are provided with fmall teeth *r*, *r*, *fig.* 6, which are fitted into dovetailed notches formed in the blade of the chiffel. Thefe are called *fcribers:* they have a fharp edge projecting a fmall diftance beyond the infide edge of the chiffel, and, therefore, in defcending through the mortife, the fcribers cut the fides of the mortife fair, and cut two clefts which feparate the chip (which will be cut out at the next ftroke) at its edges from the infides of the mortife, fo that the chip comes out clear without fplitting at the edges, and this makes the infides of the mortife as clean and fmooth as poffible. Each chiffel has a piece of fteel *t*, *fig.* 6, fixed on before the edge, by a fcrew which projects from the middle of it, and is fcrewed into the blade of the chiffel: the upper end of the piece being received in a notch or groove formed in the chiffel attaches it faft thereto. This piece, or nofe, is for the purpofe of clearing the chips out of the mortife as faft as the chiffel cuts them; for though, in general, when the fcribers are in proper order, the chips fall down through the block like pieces of pafteboard, yet it may happen that they will ftick in, and then without this nofe-piece would clog up with the chips, fo that the chiffel could not be got down through them. The block is faftened into the carriage by means of a fcrew *r*, which has on the point of it a ring of the fame dimenfions as that on the fcrew of the boring machine, and is inferted into the impreffion made in the end of the block by that ring There are three of thefe fcrews, for the purpofe of holding one or more blocks at the fame time. The centre fcrew is ufed for fixing one double or threefold block; or, the two other fcrews are ufed, when two fingle blocks are to be fixed in at the fame time. The centre fcrew is then ufelefs. By means of thefe fcrews, the true pofition of one end of every block is determined, fo that it will fall exactly beneath the chiffel A. The other end of the block is gauged into its place by ftops: thefe are attached to a crofs-bar, 1, placed acrofs the carriage, its ends being received into notches made in the fides, and thefe notches afford the means of fixing the bar at any place correfpondent to the length of the block which is to be mortifed. Againft this crofs-bar, the ends of the blocks are preffed by means of the fcrews *r*, *r*, and oppofite to each is a fharp-edged fteel ring to penetrate and hold faft the block: but to prevent it from turning round, on thefe two rings as a centre, each of the rings fixed on the crofs-bar has two fmaller rings infcribed within it, which alfo penetrate the wood, and thus faften the block in the firmeft manner. This is fhewn at *fig.* 5. The gauges before-mentioned, for guiding the block to its true fituation, are formed on a piece of iron 2, which has two arms, 3, 3, projecting from it. Thefe have other arms rifing from them at the ends in a vertical pofition, and againft thefe one fide of each block is applied to make it vertical. A fmall piece of iron 4, which is fitted upon two vertical pins 5, 5, and can flide up and down upon them, and faften at any elevation by means of two clamp fcrews, forms the guage for the height of the block, and is by thefe fcrews adjuftable for blocks of different breadths. The two arms, 3, of the piece 2, are formed at the fame diftance afunder as the fcrews, *r*, in the front of the carriage, fo that when one is fet in the pofition for a block to be held by one fcrew, the other block will be at the proper place for the other fcrew. The adjuftment for the different thickneffes of the blocks, is made by fliding the whole of the piece, 2, endways, for which purpofe the fcrew which faftens it to the crofs-bar 1, paffes through a groove in the piece which admits this adjuftment, and gives means of faftening it at any place correfponding with the thickneffes of the blocks.

The operation of the mortifing machine is as follows: the block brought from the boring machine has the point formed by the fcrew thereof applied to the end of one of the fcrews at *r*, *r*, in the carriage of the mortifing machine, and by fcrewing it tight, the block is fixed between its point and the double circle points before mentioned on the crofs-bar 1, and the ftops fituated on this bar guide the block to its proper pofition, which is, that the hole bored for the commencement of the fheave hole fhall be vertical. The block being thus fixed, the handle, *s*, is turned till the hole is brought beneath the chiffel A. The machine is now put in motion with the lever V, as before defcribed, by jambing the wheel R into the cone within the pulley H of the fly-wheel. At the firft defcent of the chiffels, they cut down through the whole depth of the holes previoufly bored, fo as to cut a flat fide to them. When they rife up, the excentric, circle *b*, moving the bent lever and rod, *e*, moves the ratchet wheel M round one tooth, and advances the block a very minute quantity forwards from the fly-wheel, fo that the chiffels, in defcending, cut a frefh fpace, and, in afcending, the block advances; and in this manner it proceeds with aftonifhing rapidity through the whole length of the intended mortife,

mortife. At this time, the loaded end, *o*, of the lever, *i o*, drops off the ruler fixed at the fide of the carriage C D, and rifes the levers *n* and *e*, fo that the farther advance of the block is prevented. The attendant to the machine, as foon as he obferves this, ftops the motion by moving the lever V, and he takes care to do it at the inftant when the chiffels are at the higheft point, which is effected by a dextrous movement, for the fixed cone, W, ftops the machine inftantaneoufly.

The finifhed block is now removed, and a frefh one put in the handle, *s*, turned back to return the carriage, and bring the block to the proper point, when the machine is ftarted, and proceeds as before.

Three mortifing engines of different dimenfions are ufed at the mills, correfponding with the different fizes of blocks to be manufactured. The fmalleft and largeft of thefe is what we have defcribed in our *Plate*. The intermediate machine was made before the others, and with fome difference in its conftruction, though none in its effect. The motion of the fliding frame for the chiffels is communicated to it by means of a long working beam or lever, extending the whole length of the frame at the top of it. At one end, it is united by a connecting rod with the chiffel frame; and at the other, it is fixed to an axis, which is fupported by the framing, and which forms its centre of motion. A connecting rod is joined to it in the middle of the beam; and the lower end of this is worked by a crank, formed in the middle of the main axis, which is fituated in a direction perpendicular to that which we have defcribed, and is fupported in the framing. It is provided with the cone for cafting off the movement. This machine operates equally well with the others, from which, indeed, it does not differ in any effential point. But the movement of the machine we have drawn, is that which is moft complete, and lefs fubject to violent ftrain in any part. The engine with the beam acts with furprifing rapidity, as it makes upwards of 400 ftrokes *per* minute, at every one of which it cuts out a chip from each mortife as thick as pafteboard. Its movement is fo extremely quick, that the chiffels cannot be diftinctly feen when it is at work, and the mortifes are obferved to lengthen, and chips fall out without any evident caufe. The blocks, being thus mortifed, have their angles fawn off, as a preparation to giving them their elliptical figure, by

The Corner Saw.—This is a circular faw, fhewn at *figs.* 8 and 9 of *Plate* IV. where *fig.* 7 is a plan of the bench, *fig.* 8 a front elevation, and *fig.* 9 an end fection. In thefe, A is a circular faw, fixed upon a fpindle *a*, mounted in an iron frame B, like a lathe fpindle, and turned by a band round the pulley C. The block is placed upon an inclined table D, which prefents it to the faw, fo as to remove a proper portion of the angle, and prepare it for the fhaping engine, which forms the exterior furface of the block. The block lodges againft the ledge, E, of the table, which guides it whilft it is fawn, by keeping it to the fame diftance from the faw. It is accommodated for blocks of different dimenfions, by placing wooden rulers of proper thickneffes againft the ledge E, to bring it near to the faw. In one of thefe machines, the ledge, E, is fitted with connecting bars in the ftyle of a parallel ruler, fo that it can be fixed at any diftance from the faw, but always parallel thereto. The faw is fixed on a chuck, which is attached to the fpindle for fawing, fo that it can be quickly removed to fharpen the faw.

The Shaping Engine.—The fhaping engine confifts of a double wheel, called its *chuck*, in which ten blocks are fixed at once. Thefe being turned rapidly round, a gouge is fixed fo as to intercept them, and form their external furfaces to fegments of the circles in which they all revolve. This is the general principle of the machine. Its particular conftruction is explained by *Plate* VI. where *fig.* 1 is an elevation; *fig.* 2, an edge view; and *fig.* 3, a plan. The detached figure parts we fhall foon explain. The feparate figures at X and Y, in the corner of the plate, are introduced to explain the ftate of the block when it is brought to this ingenious machine, and to fhew alfo the change made upon it. *Fig.* X is a front view, and Y an edge view of a double fheave block. The outlines fhew the form of it when finifhed in the fhaping engine, and the dotted lines its form before it is put into it. Thus the four angles are fhewn as cut off in *fig.* X by the corner faw, preparatory to giving it the elliptical figure it is to have. The other view fhews nothing cut off by the corner faw, the whole alteration being made by the fhaping engine. This figure alfo fhews the ftate of the mortifes.

The machine, as before-mentioned, contains ten blocks, which are all fhaped at the fame time, being fitted in a large wheel, or rather, between the circumference of two wheels A A and B B, having a common axis C C. The blocks are fhewn at the letters E, E; and the plan, *fig.* 3. explains the manner in which they are held between the wheels by a fcrew, *a*, having a fteel ring fitted upon the point of it, which is exactly the fame in all refpects as the ring on the point of the fcrew of the boring machine; and the ring of the fcrew *a*, being inferted into the impreffion made in the end of the block, fecures one end; the other is retained by a ring, *b*, of the fame dimenfions, containing two others within it, which enter the impreffion made in the other end of the block by the double rings in the carriage of the mortifing machine, to which they are exactly a counterpart. The double ring, *b*, is formed in the end of a fhort fpindle, fitted in a focket through the rim of the great wheel A, exactly oppofite the fcrew *a*, and has on the outfide of the wheel a fmall toothed wheel *d*. The fcrew, *a*, being tightened up by a winch, the block becomes faftened in between the point of it and the fpindle *b*, as it were in a lathe. The compound wheels A A, B B, or more properly the chuck, as we fhall in future call it, being thus filled with blocks, has a rapid circular motion given to it by means of an endlefs rope encompaffing the pulley, F, on the main axis. Now it is evident that a cutting tool, being prefented to the blocks as they revolve, will form their exterior furfaces to fegments of circles, of the fize of that which they revolve in. This tool, which is a gouge, is held in a fliding reft, fhewn feparately in *figs.* 4 and 5, and is alfo feen in the other figures. It confifts of a dovetailed flider G, accurately fitted into a groove, which is part of a frame H, that is attached to a long metal bar I K, curved to a fegment of a circle; fee *fig.* 1. At one end, K, it is fitted on a centre piece, fixed in a crofs-bar of the frame, exactly beneath the centre of the axis of the chuck: the other end of this bar, which may be called the radius, refts upon a part of the framing L, which is curved to a circular arch, and on this the radius refts, as it fweeps on its centre from one fide to the other of the machine. The flider G, for the gouge *g*, is advanced towards its work by a lever M, having a handle *m*, *figs.* 3 and 4, at one end; and the other is fitted on a centre pin *n*, fixed in a projecting part of the frame of the groove H. To the middle of the lever a fhort connecting bar, *h*, is jointed, and communicates the power of the lever to the flider G, and confequently advances the gouge *g*, which is held in the end of it, towards its work: but the quantity of this advance is determined by a roller *e*, the axis of which is fitted in a focket attached to the flider G: it bears againft a guide or pattern ruler N, which is fupported on two pillars from the frame of the machine. The pattern ruler has fuch a degree

gree of curvature, as ſhewn in the plan, that when the roller, *e*, of the ſlider, G, is kept in contact with it by a preſſure on the handle, *m*, towards the machine, and the whole ſlide reſt is ſwept along its curved reſt L, the edge of the gouge, *g*, will deſcribe that curve which the ſurface of the block is intended to have, as ſhewn by the dotted line at E. The manner of action in this machine is eaſily gathered from what we have ſaid. The chuck being filled with blocks, as before related, the ſliding reſt is moved quite to the end of its ſlider L, and in this ſtate the machine is put in action. The workman now holds the handle, *m*, in one hand, and the long handle, R, (which is attached by a joint to the frame H,) by the other hand: with the former he preſſes towards the machine to keep the roller, *e*, in contact with the ruler N, and by the latter he ſweeps the gouge ſlowly and ſteadily from one ſide of the frame to the other. In this circuit, the edge of the gouge removes the angles of all the ten blocks at once, reducing them on the outſide to the figure of the dotted line E in the plan, which, as before explained, is determined by the curve of the pattern ruler. This being done, the machine is ſtopped, and it is receſſary to turn all the blocks round one quarter upon their reſpective axes to preſent another ſide outwards, that it may be ſhaped to its proper curve in its turn. This is accompliſhed in a very ingenious manner. Each of the ſmall ſpindles, *b*, has, as before ſtated, a ſmall wheel, *d*, fixed upon it, and to every one of theſe an endleſs ſcrew is adapted. The axes of all theſe ſcrews marked *f*, tend to the centre of the chuck, and each has a ſmall bevelled cog-wheel upon it; and all theſe are turned by one large bevelled wheel O, which is fitted upon the main axis, but ſlips round freely thereupon. It has a pin projecting from a part of its circumference, which is detained by means of a ſtop Q, *fig.* 1, jointed to the frame at the lower end, and forked at top, to catch this pin when it is moved on its joint ſo as to approach the wheel; but when thrown back by a ſpring in its joint, into the poſition of the figure, it is out of action. When the blocks are to be turned round one quarter, this ſtop is preſſed towards the wheel, and the pin, by turning the chuck round, catches in the forked top of it, and prevents the wheel from turning. The workman now, by taking hold of the chuck, turns it round four times, as he determines by obſerving a mark made upon one part of the run of the chuck coming oppoſite to ſome part of the framing. In theſe four turns of the chuck, the centre wheel, O, remaining ſtationary, the blocks are, by means of their endleſs ſcrews *f*, turned round one-fourth of a circle, and the next face of each block is turned outwards to be ſubjected to the action of the gouge. But the ſides, now expoſed, being thoſe in which the mortiſes are made, are of a more rapid curvature, being of an elliptical figure, as ſhewn at X, in the corner of the plate, while the former was only ſlightly rounded. To give this difference of curvature, a new moulding ruler, N, is employed. This is fixed immediately beneath the other one, as ſhewn by *figs.* 1 and 2, and the roller, *e*, of the ſlider, G, is adapted to act upon either; its axis being let down in its ſocket, and retained at the proper level to work with either, by a clip or claſp (not ſhewn in the figures,) which enters either of the two grooves formed round in the ſpindle of the roller; and for the purpoſe of elevating or depreſſing the roller, its ſpindle has a head, S, fixed on the top of it. The roller being now ſhifted to the proper pattern ruler and all the blocks, the turning of theſe ſides is performed in the ſame manner as the firſt, but, of courſe, giving it a different curvature correſponding to the difference of the two moulding rulers. The machine is now ſtopped, the blocks ſhifted to another quarter, the guider roller, *e*, returned to its firſt ruler, becauſe the machine is now to form thoſe ſides of the blocks oppoſite to what were firſt done, and therefore the ſame curve. The chuck being again ſet in motion, the third ſide is turned. The movement is now ſtopped, the roller, *e*, ſhifted to the ſame ruler as for the ſecond ſide, and the blocks being turned round another quarter, the laſt ſide is finiſhed, and they are removed from the machine to make way for another ſet.

This ingenious machine is adapted to receive blocks of different dimenſions by the following means: the length of the blocks are allowed for, by placing the wheels, A A, B B, of the chuck at a greater or leſs diſtance aſunder upon their axis C. This is done by the five ſcrews, T, which unite them. The wheel, A, is fixed faſt to its axis, and the other ſlides upon it, to regulate their diſtance; the ſcrews, T, have nuts upon them, both within and without the wheel B, ſo that they hold it quite firmly at the intended diſtance from the other. The next adjuſtment, dependent on the ſize of the block, is that the edge of the gouge ſhall deſcribe its curve at the proper diſtance from the centres of the ſeveral blocks, to make them of the intended dimenſions. This would be adjuſted by placing the pattern rulers, N, at a greater or leſs diſtance from the blocks; or, what has the ſame effect, altering the diſtance between the centre of the roller *e*, which applies to the rulers, and the edge of the gouge *g*. For this purpoſe, the ſocket for the ſpindle of the roller is fitted into a groove in the ſlider G, and is regulated by a ſcrew, P, at the end of the ſlider. The trial is made by ſetting the gouge oppoſite the centre of the block, as in the plan, and turning the ſcrew P, until the edge of the gouge very nearly touches the block in the centre, becauſe it is intended only to take off the corners of the block, little or nothing being removed from the middle. This adjuſtment is neceſſarily made every time the gouge is removed from the ſlider to ſharpen. The gouge is faſtened into the holder, at the end of the ſlider G, by means of a ſcrew, as ſhewn in *fig.* 5.

Three moulding rulers are ſhewn in the figures, though we have only explained the uſe of two. Double and ſingle ſheave blocks of the ſame lengths have both the ſame curvature on the edges in which the mortiſes are, and therefore they may be ſhaped indifferently from the ſame pattern ruler: but conſidering them in the other direction, *viz.* that in which the plan exhibits them, the gouge is required to traverſe its curve at nearly twice the diſtance from the centre of a double block, to that required for the ſingle ſheave; and this is effected by providing an additional pattern ruler for the ſingle blocks: therefore, in the machine as repreſented, one ruler is adapted for ſhaping the edges of either ſingle or double blocks, a ſecond for the outſides of the cheeks of double blocks, and a third for the cheeks of ſingle blocks: all the three rulers can be quickly removed from the machine, and others of a different curvature ſubſtituted, being only fixed by two ſcrews to the pillars which riſe from the reſt L; and a great variety of theſe patterns are provided to ſuit all kinds of blocks, of which an amazing number of ſhapes are in uſe in the navy. As this ſhaping engine is a machine which would be very eaſily applied to other purpoſes, it may not be unintereſting to deſcribe the manner of forming a pattern ruler to ſhape any curve. It is done experimentally by chooſing ſuch a block as is of a proper figure, or forming one by hand to the intended curvature, and fixing it in the chuck; then ſubſtituting any blunt tool in place of the gouge, and fixing a ſharp tracing point on in the end of the centre pin of the roller *e*: a piece of board is fixed in place of the pattern ruler. The tool is now

now applied to the block fixed in the chuck; and being kept in contact with it, while the fliding reft is fwept from one end to the other, the point in the centre of the roller traces a curve upon the board: the block is then to be removed, or turned out of the way. Now by placing the fliding reft fucceffively at different parts of its fweep, and thrufting the flider, G, towards the machine by its lever M, the tracing point will defcribe ftraight lines upon the board, all tending to the centre of the machine, or rather to the centre, K, of the radial bar; and as many of thefe being made at fhort intervals as is thought proper, the board is removed. A pair of compaffes being now opened to the exact radius of the roller *e*, this diftance is fet off, from the traced curve, upon every one of the radial lines, thus transferring the curve as much nearer to the centre as the femidiameter of the roller. A curve is now drawn through thefe points, and the board being cut to it, will have the curve defired, and may be ufed as a pattern to caft a metal ruler from, which being fixed in the fame points as the board was, will fhape the blocks to the form of that which was employed as the pattern for it.

Three fhaping engines are employed for blocks of different fizes: the largeft, which was laft made, is that we have defcribed; the fmaller one is very nearly like it; but the intermediate fize, like the mortifing machine, is of a lefs perfect conftruction, and fhews the progrefs of invention: it holds but a fmall number of blocks, and thefe are turned round on their axes, one by one, by the workman. A circular plate, with four notches in its edge, which are caught by a click, is the gauge for fetting them correctly to one-fourth of a turn each time they are fhifted. Even this machine is a very excellent one for the purpofe, though greatly improved in the fecond and third, which were made by the introduction of the wheels and fcrews for fetting all the blocks together, which is a moft ingenious contrivance.

The large machine has a contrivance, very fimilar to the mortifing machine, for checking its motion as foon as the movement is caft off; for otherwife the momentum of the chuck loaded with blocks would be confiderable. The machine in our plate is reprefented with a wheel, V, upon it, which is furrounded by a brake or gripe: this is relieved from the wheel by a fpring, when the machine is in motion; but when the workman preffes a lever (omitted in the drawing), it encompaffes the wheel by its gripe, and caufes a friction, which quickly ftops the machine. The framing fupports a number of iron bars, which enclofe the chuck as it were in a cage. This precaution is very neceffary to the fecurity of the workman; for if the blocks fhould get loofe, as has once happened, they would be thrown by the centrifugal force with the velocity of bullets, and might do ferious injury. The accident alluded to was occafioned by one of the wheels of the chuck cracking in the rim, fo as to let loofe the blocks, and they all flew out behind the machine, paffing through a window, into the fteam-engine houfe, where they ftruck the governor or regulating balls of it, and broke them in pieces. It is fingular that, in paffing through the window, all the blocks followed each other through the fame pane of glafs with great violence.

Scoring Machine.—We now come to the laft machine in the feries: this is the fcoring machine, which forms the fcore round the block for the reception of the ftrap or rope, by which it is fufpended in the rigging of the fhip. The fcore is a groove, deep enough at the ends of the block to receive one-half of the rope or ftrap, but is diminifhed to nothing where it croffes the pin of the block. The machine is reprefented in *Plate* VII., where *fig.* 1 is a horizontal plan of the upper part of the machine, and *fig.* 2 a plan of that part containing the blocks; *fig.* 3 another plan taken immediately below the former; *figs.* 4 and 5 are elevations of the machine taken in two directions at right angles to each other. Two blocks, in the ftate they are finifhed by the fhaping engine, are fcored at once by this machine: one of thefe is marked Y, the other is dotted. The groove is formed by a circular cutter A B, fituated exactly over each block: thefe cutters are circular wheels made of brafs, and formed round upon the edge. In two oppofite points of the circumference are two openings, as *a*, *a*, *fig.* 4, in which cutters with round edges are fixed to project a little beyond the rim of the wheels, in the manner of a plane iron; and they cut the wood in exactly the fame manner, except that they move in a circle inftead of a ftraight line. Thefe cutters are both fixed on one fpindle C, which is turned by a band round the pulley D, in the middle of it. This fpindle is mounted in a frame E E F F, *fig.* 1, which moves on an axis, F F, centred in the frame, (fee *fig.* 4.) fo that the fpindle has liberty of afcent and defcent by the handle H, but always keeps parallel to itfelf. The blocks are held in a frame erected upon a ftrong plate G, *fig.* 5, and fhewn feparately in *fig.* 2, which fwings on the points of two centre fcrews, *b*, *b*, in the manner of an axis: it is moved by the handle I, and governed by a pendulum K. By this motion, all parts of the blocks can be prefented to the cutters: each of the blocks is faftened in the frame by means of two pins, *d*, *d*, erected from the plate G, the block is preffed with fufficient force to hold it in between thefe by a fcrew *l*, which operates upon a clamp *e*, connected by a joint with the lower plate G. The upper end of this clamp has a half ring formed in it, which catches in the impreffion made in the end of the block by the preceding machines, and thus fixes it, fo that its centre comes beneath the cutter; and as the block is fhaped equally on each fide of its centre, it will affume the true pofition, by being forced between the two pins *d*, *d*, without regard to the fize of the block. The frame, E F, has a curved piece of iron fixed beneath it, which is formed fo as to inclofe the pulley, D, on the lower half, as clofe as it can be not to touch, and is therefore concentric with the axis C. This piece of iron comes down upon the edge of a metal plate L, which is the pattern for fcoring the block, as it regulates the depth to which the fcore fhall be excavated, being nothing at the centre of the block, and deep enough at the ends to bury half the ftrap. The action of this machine is fimple. The blocks being fixed as before mentioned, the workman takes one handle, H and I, in each hand, and by the upper one keeps the curved iron always in contact with the pattern, L, beneath it: at the fame time, by depreffing the handle I, the blocks are inclined, fo that they traverfe beneath the cutters A, B, to form the fcores from their centres to the ends of them, the two pins *d*, *d*, admitting the cutters between them quite to the ends of the blocks, and in depth as much as the pattern, L, allows the cutters to defcend beneath the furfaces of the blocks. Now it will eafily be feen, that by raifing up the handle I, the other ends of the blocks might be fcored in the fame manner, and fo indeed they are in the firft machine that was made, and which is ftill in ufe at Portfmouth: but the objection to the method is, that the cutters cut againft the grain of the wood, fo as to be rough, in the fame manner as when a carpenter planes the edge of a board obliquely to the direction of the grain, if he planes from one end it will cut fmooth, but in the other direction it will cut ragged and rough. To avoid this in the machine before us, the plate G, to which the blocks are immediately fixed, is united to another plate M beneath it, by a centre a centre pin *m*, which is exactly beneath the pattern L, and also in the middle between the two blocks and cutters: on this as a centre, the upper plate, G, turns round, and is detained by a spring catch *n*, which is fixed to the lower plate, and falls into a notch made in a projecting part of the upper plate G, when the two blocks are in their proper position. The first quarters of the scores of two blocks being cut as before described, the workman relieves the catch *n*, and turns the plate, G, half round on its centre, when the catch again detains it in this position, by which the blocks are reversed, having exchanged situations, and their finished ends are outwards; consequently, the other ends, where the screws *l*, *l*, are, are beneath the cutters; the handle I being, therefore, depressed as before, cuts the second quarter of the score, and in the same manner as the first, being in the proper way of the grain of the wood to cut smooth. This completes one half, and the blocks are taken out to be turned the other side upwards, to cut the scores in them by a repetition of the same process as we have described. The axis of the frame, E F, has a lever proceeding from it behind, which is loaded with a sufficient weight to counterpoise the weight of the frame and cutters, giving them a constant tendency to rise upwards, and thus keep out of the way when the handle is left to itself. The pattern L, which determines the depth of the score, and therefore depends upon the curvature of the block, can be quickly removed from the machine, to make way for any other shape being fixed to the plate, G, by only two screws. A great variety of these patterns is required, as well as for the shaping engine, and their curvature is determined by the same means as we have before described of that machine.

The operation of scoring is the last which is performed by machinery upon the shells of the blocks, which are now completely formed, and only require to be rasped and filed to a smooth surface, which the machines will not always do, though they cut them perfectly correct to the intended forms; but the wood is not always so hard and perfect in its texture as to make them smooth, small pits being left in various parts, which require the aid of files and rasps to remove them; though, by a little labour of this kind, they are made as neat as can be wished. The machines will, when their cutters are in order, and the wood of good quality, cut as smooth as any thing can be expected. Of this we are convinced by having seen the performance of a set of working models of these machines, which we hesitate not to say are the most perfect and elegant models that have ever been made of any kind of machines: they are about four times the size of the drawings in our plates, and are all placed upon one large table, so as to exhibit the whole of the operations, as they succeed each other, at one view. A very elegant model of a steam-engine, made on Mr. Maudslay's pattern, actuated the whole. These models are deposited in the Admiralty house, Westminster. They operate in a more precise manner than the large machines, their cutters being kept exceedingly keen, and the wood they work upon being of a harder and better kind. The blocks at Portsmouth are made of elm, which is a very proper wood for them, not being liable to split: the sheaves, as we have before-mentioned, are made of lignum vitæ.

In the operation of dressing the blocks by hand, we must notice a plane, for making the insides of the mortises perfectly smooth and flat; for though the mortising engine will, when in very good order, cut as correctly as possible; yet it is advisable to plane the insides, to be certain that they are not rough, for that would occasion a great friction at the sides of the sheave. The plane is of the same form as a carpenter's, but is made of brass and very thin, that it may enter the mortise. It is fixed projecting horizontally from the edge of a work-bench, and the workman, taking the block by its end, inserts the end of the plane into the mortise, and thrusts it forwards. The plane cuts a shaving from the inside of the mortise, in a direction across the grain, and thus at two or three strokes finishes them, and they are ready for putting together, which completes the blocks. As connected with this subject we shall describe the

Machine for making dead Eyes.—This is a very ingenious and complete machine, and it forms the whole of the article at once. The pieces of wood being sawn to the size, have the holes bored through them in the boring machine, for the reception of the rope which is to be reeved through them. Two of these holes are equi-distant from the centre of the block of wood; and by means of these two holes, it is fixed in the machine, which shapes and scores it at twice fixing. This is represented in *Plate* VII. where *fig.* 6 is a plan of the whole machine, and *fig.* 7 an elevation in front. The frame or bench sustaining it, is omitted, only the working parts being shewn. It is a lathe, to which proper mechanism is added. A B is its spindle, supported between the standards Y, Z, and C the pulley for turning it by a band D. *Fig.* 6 is a chuck, screwed to the end of the spindle: this chuck has a double screw, *a b*, in it; that is, a right and left handed screw, which operates upon two sliders, carrying two round pins, *x*, *x*, which project from the face of the chuck: one of these sliders is moved by the right hand part of the screw, which is the end *a*; and the other by the left hand part, which is the end *b*; and the screw being retained by a collar in the centre of the chuck, the two pins, *x*, *x*, with their sliders, mutually advance or recede, when the screw, *a b*, is turned with a wrench applied to the square ends *a* or *b*, *fig.* 6. By means of these pins, the block, *f*, is readily fixed to the chuck D. The screw, *a b*, is turned till the pins, *x*, *x*, are at the same distance asunder as the two holes in the block *f*, which is then hung on the pins, and the screw being turned, forces the two pins farther from the centre, and thus fastens it firmly to the chuck; and as the pins are always equally distant from the centre, they chuck it always truly. The turning tool, which is a gouge, is applied by a sliding rest, and apparatus of the same kind as that of the shaping engine. E is the circular iron rest on which the tool sweeps, and is supported to bear the pressure of the work. F is the radius bar, turning round on a centre pin, fixed in the frame immediately beneath the work, in the line of the spindle; and this radius is in one piece with the frame H, which is the foundation of the sliding rest. This consists of the dove-tailed slider, G, fitted into a groove formed on the top of the frame H: this slider is advanced to its work by the lever M, which has a handle, *m*, at one end, and the other is fitted on a centre pin, *n*, fixed in an arm projecting from the frame H. N is the shape or pattern ruler, supported by two columns, O, O; and is the roller which applies to the shape when the handle, *m*, is pressed towards the machine, as shewn by a dotted circle in *fig.* 6. The whole rest is swept round on by E, a handle similar to that of the shaping engine, but no part of which is shewn in these figures. The angles of the block are removed by the corner saw before it comes to the machine in which it is chucked, as before-mentioned, and then the spindle, A B, is put in motion. The workman, by the two handles, as before explained, of the shaping-engine, sweeps the tool one quarter round on the centre of its radial bar, F, and the roller applying to the shape, N, gives the dead eye, *f*, its intended curvature. The machine being stopped, the dead eye is removed from the chuck, and reversed; the other side being presented

to

to the tool is ſhaped in the ſame manner : the ſcore now remains to be cut round its circumference. If this was merely a groove all round, it would be eaſily turned by a gouge, but cuſtom has eſtabliſhed, that it ſhall not continue quite round the dead eye, but have one point, (where the ends of the ſtrap are to unite,) left ſolid. This is ſhewn in the plan *fig.* 6, and alſo in the other view, *fig.* 7, by the dotted line, *n*, being the ſolid part. This being the form of the ſcore, it requires ſome particular mechaniſm to cut it, which is effected in this manner ; a ſpindle, P, with a cutter, Q, ſimilar to the ſcoring engine, is mounted in a frame, R S, which moves on a centre at S, ſo as to approach or recede from the work at pleaſure. The ſpindle has a very rapid motion given to it by a band paſſing round the pulley T, and the cutter, being applied to the work, excavates the ſcore as the block and ſpindle are turned round. The depth to which it is permitted to cut is determined by a roller, *d*, ſituated at the end of a rod, which is fitted on the axis, S, of the frame R S, and attached firmly to the frame by an arch V ; in which is a groove to receive a clamp ſcrew, which gives the means of faſtening it at any point, and the roller then becomes a part of the moving frame R S. This roller applies itſelf to a pattern, or ſhape-wheel, W, fixed on the ſpindle, and turning with it. Its figure is circular, except a projecting knob on one ſide, *w*, as ſhewn by the dotted lines in *fig.* 7.

The manner of uſing this ſcoring apparatus is as follows : the ſhaping being performed as before deſcribed, the motion of the ſpindle is caſt off : the workman now goes to the oppoſite ſide of the machine, and taking hold of the frame, R S, by one hand, and the pulley, C, of the ſpindle by the other, then applies the cutter (which before hung back out of the way), at the ſame time turning the work ſlowly round by its pulley : this cuts out the ſcore, the pattern-wheel determining its depth, and the projecting part, *w*, of the pattern-wheel, when it comes round, lifts the cutter out altogether, leaving the ſolid, or unformed part of the ſcore at *n*, as we have before deſcribed.

This machine readily adapts itſelf to receive different ſizes : the two pins *x*, *x*, firſt mentioned in the face of the chuck D, ſcrew into the ſliders of the chuck which are moved by the double ſcrew *a b*, and can be removed to put on any ſize correſponding with the ſize of the holes bored through the dead eye : theſe pins are made hollow, to avoid unneceſſary weight in the moving parts. The ſcrew, *a*, in the chuck will (as before-mentioned) expand the pins to hold any ſized block. The ſcrew *r*, at the end of the ſlider, regulates the poſition of the roller which applies to the ſhape N, and thus adapts to the thickneſs of the dead eye. The operation of this adjuſtment will be underſtood by referring to the ſhaping-machine. The ſhape, N, is readily changed, to make different ſizes, by introducing others of a different curvature : for this purpoſe, it is only held on the pillars O, O, by notches, as ſhewn in the plan, and nuts being ſcrewed upon it to hold it faſt. The ſcore is always in the middle of the dead eye ; and, therefore, for different thickneſſes, the cutter, Q, muſt be ſhifted endways : this is done by ſliding the whole frame, X, ſupporting the centres, S, on which the frame, R S, of the ſpindle moves as a centre ; the ſcrews, *t*, *t*, which hold it, are fitted in grooves to admit of this motion, and the pattern-wheel, or ſhape W, as well as the roller, *d*, which applies to its circumference double the neceſſary width, to allow this variation, without loſing their bearing. The projecting part, *w*, of the pattern-wheel, conſiſts of an iron bridge, ſcrewed on to the rim of the wheel : it is made very light, and has a balance weight on the oppoſite ſide of the rim to balance its weight ; for, if this was not attended to, the rapid revolution of any unbalanced weight would, by its centrifugal force, acting ſucceſſively on all ſides, cauſe a tremor of the whole machine, and a great wear and friction on the centres of motion ; but when truly balanced, the motion is pleaſant and equable.

MACHISCHEVO, in *Geography*, a town of Ruſſia, in the government of Tobolſk ; 36 miles W. of Iſchim.

MACHLIS, in *Natural Hiſtory*, a name uſed by Pliny and ſome of the old authors, for the elk, and alſo for the rein-deer.

MACHONOWHA, in *Geography*, a town of Poland, in the palatinate of Braclaw ; 60 miles E. of Braclaw.

MACHRIANICK BAY, a bay of Scotland, on the W. coaſt of Kintyre. N. lat. 55° 27′. W. long. 5° 43′.

MACHSA, a town of Arabia, in the province of Yemen ; 25 miles E.S.E. of Zebid.

MACHUA, a town of Hindooſtan, in the circar of Sirowy ; 20 miles N. of Jalour.

MACHUL, an inſtrument of muſic among the Hebrews : Kircher apprehends that the name was given to two kinds of inſtruments, one of the ſtringed and the other of the pulſatile kind. That of the former ſort had ſix chords. Though there is great reaſon to doubt whether an inſtrument requiring the aid of the hair-bow, and ſo much reſembling the viol, be ſo ancient. The ſecond kind was of a circular form, made of metal, and either hung round with little bells, or furniſhed with iron rings, ſuſpended on a rod or bar that paſſed acroſs the circle. Kircher ſuppoſes that it was moved to and fro by a handle fixed to it, and thus emitted a melancholy kind of murmur.

MACHYNLLETH, or MACHYNLLAETH, in *Geography*, a market town in the hundred of the ſame name, in the county of Montgomery, North Wales, is ſituated at the conflux of the rivers Dulas and Dovey, 37 miles diſtant from the county town, and 207 from London. It has a claim to high antiquity, being generally ſuppoſed to have been a Roman ſtation, named the Maglona of the Itinerary : many ancient coins have been diſcovered in the vicinity. In this town, Owen Glendwr, in the year 1402, when, from repeated ſucceſſes, he was in the meridian of his glory, aſſembled the eſtates of Wales, and held a parliament ; by which his title to the principality was ſolemnly acknowledged, and he was formally inaugurated ſovereign of Wales. On this occaſion he narrowly eſcaped falling a victim to the hatred of his brother-in-law Dafydd Gam, who attended the aſſembly with intent to aſſaſſinate him ; but his deſign was timely diſcovered. An old houſe, now divided into tenements, is ſhewn as being that in which the parliament was holden. The inhabitants of this town are chiefly employed in handicraft buſineſs ; that of tanning being carried on to a conſiderable extent, as is alſo the manufacture of flannel, and of what are provincially termed webs, and Welſh plains or cottons. Theſe are a coarſe ſort of thick white cloth, made in pieces from ninety to one hundred and twenty yards in length : this article formerly conſtituted a portion of the export trade, but latterly has been appropriated to clothing the army, and for home conſumption. Seven annual fairs are held here, and a weekly market on Wedneſday. The population of the pariſh, which includes, with the town, the townſhips of Is Carreg and Uwch Carreg, was, in the year 1801, returned to parliament as 1825, occupying 372 houſes. Pennant's Tour in Wales. Carliſle's Topographical Dictionary of Wales.

MACIAS, EL ENAMORADO, in *Biography*, a Spaniſh poet, celebrated as one of Love's martyrs, was born in Galicia towards the cloſe of the fourteenth century, and educated in the houſehold of the famous Henrique de Villena, maſter of Calatrava, who was very friendly to him.

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He fell in love with a damfel of the fame houfehold; the paffion was mutual, but effectually concealed from all other perfons, and when Macias was abfent, the mafter gave her in marriage to a knight who refided in Porcuna. Macias on his return grew defperate, which occafioned his imprifonment at Arjonilla; here he employed himfelf in making verfes on his miftrefs, fome of which were carried to the hufband; who, in a fit of rage, mounted his horfe with a fpear and fhield in his hand, rode to the prifon, and flew the unfortunate captive as he was finging a fong in honour of his love. Other accounts fay that he bribed the keeper of the prifon to untile a part of the roof, and flew him from above. He was buried in the church of St. Catalina, at Arjonilla, and this fhort epitaph was infcribed on his tomb "Aqui yace Macias el Enamorado." The lance was preferved upon his grave, and fome Spanifh verfes written under it. In fuch cafes, fays the biographer, the Spaniards generally take part with the hufband; but Macias was a poet, and the poets took up his caufe. Their works are full of allufions to this ftory. The fong which occafioned his murder is preferved in the Efcurial, and has been printed by Argote de Molina in his "Nobleza de Andalucia," and by Sanchez in his notes upon the marquis of Santillana's letter. Gen Biog.

MACIECOW, in *Geography*, a town of Poland, in the palatinate of Chelm; 40 miles E. of Chelm.

MACJEJEWICE, a town of Poland, in the palatinate of Lublin; 44 miles W.N.W. of Lublin.

MACIGNO, in *Mineralogy*, the Italian name of a rock, which is employed for the purpofes of building at Florence, and throughout Tufcany, where it is faid to conftitute entire mountains of a ftratified ftructure. Patrin, who calls it "une pierre marneufe et micacée," has given the following account of this ufeful ftone. There are two varieties of macigno with regard to colour; one of them, called *pietra bigia,* is of a greyifh-yellow; the other, denominated *pietra ferena,* of a blueifh-grey colour. This latter, of which moft of the houfes of Florence are built, has the inconvenience of becoming black when expofed to the air, and at length to decompofe. The *pietra bigia*, which contains much oxyd of iron, poffeffes greater folidity, and is lefs acted upon by the atmofphere; it is calculated for the exterior of buildings, while the *pietra ferena* fhould only be employed for the interior.

The upper ftrata in the macigno quarries are more clayey than the others; they refift the action of the fire fufficiently well, fo that they are made ufe of for the conftruction of furnaces and hearths. The fame hills exhibit ftrata or beds, fome of which are of a lefs folid texture than the macigno, and appear often to be nothing but indurated clay; thefe layers are called *bardellone.* The others, on the contrary, are much harder than macigno; they are of a white colour, and bear the name of *pietra forte.* This latter is the ftone which is employed for paving the ftreets of Florence.

Ferber is of opinion, that the two kinds of macigno, together with the *bardellone* and the *pietra forte*, are varieties of one and the fame rock, in which clay, calcareous earth, and mica, are by turns predominating.

The *pietra forte* varies as much as the macigno with regard to colour; it is often greyifh or blueifh-yellow, and fometimes thefe two colours are even united in the fame piece.

In the quarry of Campora, fituated two miles from Florence, and yielding the ftones with which the ftreets of Florence are paved, the pietra forte is difpofed in horizontal layers that have only a few inches in thicknefs, and are fometimes feparated from each other by fimilar layers of bardellone; and not unfrequently a cruft of calcareous fpar, of about a line in thicknefs, intervenes between the latter and the pietra forte. Ferber fuppofes, that it is this calcareous fubftance which, by penetrating into a layer of bardellone, converts it into pietra forte.

Patrin adds, that this ftone exhibits a remarkable appearance in its interior ftructure; which is, that it divides into rhomboids feparated from each other by diffepiments of calcareous fpar. This author is of opinion, that the calcareous and argillaceous particles have been depofited at the fame time; that afterwards a feparation has taken place by elective attraction, and that the calcareous particles, tending to arrange themfelves in rhomboidal forms, have imparted to the pietra forte the fame character which is communicated by them to the fandftone of Fontainebleau.

It is in thefe macigno hills that the beautiful varieties of marle, exhibiting landfcapes, ruins, &c. and known by the name of *Florentine marble*, are found. See MARLE.

The above is all that is known of the nature of the ftone of the neighbourhood of Florence; it fhould, however, be obferved in this place, that the *bardiglione*, properly fpeaking, appears to be a different fubftance from that defcribed by Patrin and Ferber under the name of *bardellone;* the former being the anhydrous fulphate of lime, (anhydrite and würfelfpat of Werner,) on which count Bournon has given a memoir in vol. i. of the Tranfactions of the Geological Society.

MAC-INTOSH, in *Geography*, a county of America, in the lower diftrict of Georgia, between Liberty and Glynn counties, on the Alatamaha river. It is divided into four towns, and contains 2660 inhabitants; of whom 1819 are flaves.

MACK, in *Agriculture*, a provincial term fometimes applied to a fort or kind of grain, or breed of cattle or live ftock.

MACKALLY, in *Geography*, a town of Bengal; 35 miles S.S.E. of Moorfhedabad.

MACKENZELL, a town of Germany, in the bifhopric of Fulda; nine miles N.E. of Fulda.

MACKENZIE, *Sir* GEORGE, in *Biography*, an eminent Scotch lawyer and mifcellaneous writer, was born of a noble family at Dundee in 1636. He ftudied at the univerfities of Aberdeen and St. Andrews, and finifhed the ufual courfe of claffics and philofophy; at the age of fixteen he was fent to Bourges in France, where he paffed three years in the ftudy of the civil law. On his return to Scotland, he was admitted to the bar, and foon became diftinguifhed for his talents as a pleader. He was appointed, in 1661, the advocate for the marquis of Argyle, impeached of high treafon, and fpoke with fo much fervour and boldnefs in behalf of his client, as to draw down upon him a reprimand from the bench. This, however, did not ftop his career, and in a fhort time after he was raifed to a feat on that bench in the criminal court. A piece of fervice which he rendered to the court in 1674, by effecting a reconciliation between the lords of feffion and the faculty of advocates, caufed him to be knighted, made king's advocate, and one of the lords of the privy-council in Scotland. In the contentions of that period the poft of king's advocate, which is analogous to that of attorney-general in England, was equally important and arduous. Sir George, who had embraced the doctrine of paffive obedience, exerted fo much zeal in his new office, that he obtained from the covenanters the title of the "blood-thirfty advocate, and the perfecutor of the faints of God." Notwithftanding this, he introduced into the form of criminal trials feveral alterations favourable to the accufed, and fo far from endeavouring to extend the power of his office, he confiderably retrenched it. Like other

other officers of the same rank, he has been charged with endeavouring to stretch the law of treason, especially in the cases of Baillie of Jerviswood, and the earl of Argyle, the sentence against the latter of whom was rescinded by act of parliament in the reign of William and Mary. When James II. abrogated the penal laws, sir George, who was sincerely attached to the Protestant religion in the episcopal form, resigned his office. The king, however, gladly restored him to his post, when he was convinced of the necessity of pursuing different measures, and he firmly adhered to his master's interest in the subsequent change. He opposed in council the proposed address from Scotland, to the prince of Orange on his landing in 1688, and he wrote also a memorial to that prince exhorting him to adhere to the terms of his declaration. At the convention of the estates he argued very warmly against the declaration of a vacancy in the throne, and the election of William for sovereign, and when he found his opposition ineffectual, he retired to Oxford, where he was admitted a student. He died in London in 1691, and was interred with signal funeral honours in the church-yard of the Grey-friars in Edinburgh. As a statesman, the character of sir George Mackenzie stands high for learning and talents, and he was much esteemed for public and private worth. People of different parties and feelings will judge differently of his political exertions, but his integrity and good intentions seem unquestionable. In the midst of all his public business he found leisure to compose several literary pieces, among which are "Aretino, or a Serious Romance;" "Religio Stoici;" "A moral Essay on Solitude;" "Moral Gallantry," and a play and poems. These pieces gave him the reputation of an elegant writer and sound moralist. As a lawyer, he published "A Discourse upon the Laws and Customs of Scotland, in Matters criminal;" "Idea Eloquentiæ forensis hodiernæ, una cum Actione forensi ex unaquaque Juris Parte," "The Institutions of the Laws of Scotland;" and "Observations upon the Acts of Parliament." As an advocate for monarchy, he wrote "Jus Regium," or the just and solid foundation of monarchy in general, and more especially of the monarchy of Scotland, and several other pieces. As an antiquarian and national historian, he wrote "Observations on the Laws and Customs of Nations as to Precedency, with the Science of Heraldry, as Part of the Law of Nations; and a Defence of the Royal Line and Antiquities of Scotland;" the latter treatise involved him in a controversy with Dr. Lloyd, bishop of St. Asaph, and Dr. Stillingfleet. He wrote a work likewise respecting an union between England and Scotland, entitled "Reflections upon the Advantages and Disadvantages that would happen by an incorporating Union between the two Kingdoms." Besides these, several additional moral and miscellaneous treatises issued from his pen, which demonstrated the fertility and variety of his speculations; and his aptness as a writer on almost all topics. He was the founder of the advocates' library in Edinburgh.

MACKENZIE's *River*, in *Geography*, on the N.W. part of America, rises in Slave lake, runs a N.N.W. course, and after receiving a number of large rivers, discharges itself into the N. sea at Whale island, in N. lat. 69° 14', and between 130° and 135° W. long., its course from Slave lake having been 780 miles. It derived its name from Mr. M'Kenzie, who ascended this river in the summer of 1789. The Indian natives inhabiting the W. side of the river from the Slave lake are the Strong-bow, Mountain, and Hare Indians; those on the E. side the Beaver, Inland, Nathana, and Quarrelers.

MACKERMORE, a small island near the W. coast of Scotland; about five miles E. from the island of Jura. N. lat. 55° 57'. W. long. 6° 43'.

MACKERTER's Head, a cape on the E. coast of the island of Ilay. N. lat. 55° 52'. W. long. 5° 59'.

MACKEY, John, in *Biography*, an Englishman, who followed James II. to France after the revolution, and was admitted by that unfortunate monarch to his confidence, which he scandalously betrayed, by giving information to king William of every secret with which he was entrusted. As an author he is known by his "Picture of the Court of St. Germain," which was published in 1691; and his "Memoirs of the Court of England, in the Reigns of William and Anne," published at the Hague in 1733; this work abounds in curious anecdotes. He died in 1726 at Rotterdam.

MACKNIGHT, James, a learned clergyman of the church of Scotland, was born at Irvine, in Ayrshire, in the year 1721. Having laid a good foundation in grammatical learning, he was at the age of fourteen sent to the university of Glasgow, where he displayed a most ardent thirst for knowledge, and secured to himself the approbation of his tutors. After he had completed the usual course of his studies at the Scotch college, he crossed the sea to Holland, and attended the lectures at the university of Leyden. His favourite study was theology, and on his return to Scotland he was licensed as a preacher by the presbytery of Irvine, and chosen to officiate at the Gorbals, near Glasgow. From thence he removed to Kilwinning, on the invitation of Mr. Ferguson, then minister of that place, and acted for some time as assistant in the duties of the parish. Here he established a character as a judicious and useful minister, and upon a vacancy taking place at Maybole, he obtained that living. He was ordained pastor in the month of May 1753, and continued to discharge the duties of that office full sixteen years. During this period, and amidst his various professional occupations, he composed his "Harmony of the Gospels," and his "New Translation of the Apostolical Epistles." Although the plan of the "Harmony" differed considerably from that of former harmonies, in supposing that the Evangelists have not neglected the order of time in the narration of events, the reception which it met with from the most competent judges was so favourable, that the author undertook a second edition in 1763, with improvements, and considerable additions, which consisted chiefly of six discourses on Jewish antiquities. A third edition was called for in 1804, which was published in two volumes 8vo. In the year 1763, Mr. Macknight published another work of great merit, entitled "The Truth of the Gospel History," which was the fruit of his studies and researches during the intervals between the two editions of his "Harmony." Its great object was to illustrate and confirm the internal, the collateral, and the direct evidences of the gospel history. On account of these publications the degree of doctor of divinity was conferred upon him by the university of Edinburgh. In 1769 he was chosen moderator or president of the general assembly of the church of Scotland, and was in the same year translated to the living of Jedburgh, which he held three years, when he was elected minister of lady Yester's parish in Edinburgh: from this he was translated, in 1778, to the old church, in which he continued during the remainder of his life. Dr. Macknight now devoted his time and talents to the promotion of various useful institutions as well as to the exemplary performance of his pastoral duties. He took a lead in the management of many different charitable institutions, and particularly of the

fund

fund eftablifhed by act of parliament, for a provifion to the widows and fatherlefs children of minifters in the church of Scotland. As an author, Dr. Macknight occupied a confiderable portion of his time in the execution of his laft and greateft work on the apoftolical epiftles. This was the refult of an almoft unremitting labour during thirty years: he is faid to have ftudied eleven hours in each day, and that before the work was fent to the prefs, the whole MS. had been written five times with his own hand. A fpecimen was publifhed in 1787, being his verfion of the epiftles to the Theffalonians: this was fo well received, that in 1795 the whole was given to the public in four large volumes in quarto, under the title of "A new literal Tranflation from the original Greek of all the Apoftolical Epiftles; with a Commentary, and Notes, philofophical, critical, explanatory, and practical." The whole is interfperfed with effays on feveral important fubjects, and to the fourth volume is added a life of the apoftle Paul, which includes a capital compendium of the apoftolical hiftory. Having finifhed this great work, which he had been accuftomed to regard as the grand object of his life, he was defirous of enjoying the remainder of his days free from laborious purfuits, and refufed, though earneftly folicited, to undertake a fimilar work with regard to the acts of the apoftles. He probably felt the powers of his mind failing him, and had prudence and wifdom to obey the voice of reafon and nature; and in a very fhort time after the decline of his faculties became manifeft to his family. Towards the clofe of the year 1799 he caught a violent cold, which was the fore-runner of other complaints that put an end to his life in January 1800. "Dr. Macknight," fays his biographer, "had acquired an early tafte for claffical literature, and ftudied the writers of antiquity with much critical fkill. He was deeply read in metaphyfical, moral, and mathematical fcience. His piety was fincere, rational, and without oftentation, and to be ufeful in the caufe of truth and virtue was his higheft ambition. In that branch of the paftoral office, which in Scotland is called lecturing, and confifts in a familiar expofition of the facred writings, his learning and ability were much admired, and never failed to pleafe as well as to inftruct and edify in a degree which has feldom been equalled. As a preacher, without pretenfions to the graces of elocution, he had a certain earneftnefs of manner, evidently proceeding from the heart, and from a fincere anxiety to be ufeful, which always commanded the attention, and excited the intereft of the hearers." See the Harmony of the four Gofpels, third edition.

MACKREDIPET, in *Geography*, a town of Hindooftan, in Golconda; 30 miles S. of Indelavoy.

MACKREL, SCOMBER, in *Ichthyology*. See SCOMBER.

This fifh was in high efteem among the Romans, becaufe it furnifhed the precious garum. The beft time of taking mackrel is during a frefh gale of wind, which is thence called the mackrel gale. See *Mackrel* FISHERY.

MACKREL. *Horfe*. See SCOMBER *Trachurus*.

MACKUM, in *Geography*, a town of Holland, in the department of Friefland, on the Zuyder fee; 25 miles W. of Bolfwaert.

MACLAURIN, COLIN, in *Biography*, defcended of an ancient family, the poffeffors of the ifland of Tirrie, upon the coaft of Argylefhire, was born at Kilmoddan, in the month of February 1698. His grandfather, Daniel, on leaving his ifland, removed to Inverara, and contributed very much to reftore that town, after it had been almoft entirely ruined in the time of the civil wars. John, the fon of Daniel, and father to the fubject of this article, was minifter of Glenderule; where he was greatly diftinguifhed as a faithful and diligent paftor: he was employed by the fynod of his province in completing the verfion of the pfalms into Irifh, which is ftill ufed in thofe parts of the country in which divine fervice is performed in that language. This gentleman, whofe character was highly exemplary, died within fix weeks of the birth of his fon Colin, the care of whom devolved in a good meafure upon an uncle, Daniel, who was minifter of Kilfinnan. He was ably affifted in the charge by Mrs. Maclaurin during her life, which was extended only to the year 1707, when fhe died, leaving the care of all her children to the management and fuperintendance of an uncle. In 1709 Colin, though only eleven years of age, was fent to the univerfity of Glafgow, where he continued five years applying himfelf with the utmoft diligence to his ftudies. As he was a lad of confiderable abilities, it need not be added that his fuccefs was fully proportioned to his exertions. He was accuftomed to keep a diary, in which he inferted an account of almoft every hour in the day; of the commencement and progrefs of every particular ftudy, enquiry, or inveftigation, and of his converfations with learned men. In Dr. Robert Simfon, and feveral other diftinguifhed fcholars, the youth met with ardent friends, who feemed to vie with each other who fhould moft encourage him in his purfuits by opening to him their libraries, and admitting him into their fociety and moft intimate friendfhip. The genius of this young man for mathematical learning difcovered itfelf very accidentally, when he was only twelve years of age. He met with a copy of the Elements of Euclid, and in a few days made himfelf mafter of the firft fix books without any affiftance, and thence following the natural bent of his inclination, he made fuch a furprifing progrefs, that very foon after he engaged in the moft curious and difficult problems. In his fifteenth year he took his degree of mafter of arts with much applaufe, on which occafion he compofed and publicly defended a Thefis on the power of gravity. He now turned his attention to theology, and having fpent a year in the ftudy he quitted the univerfity, and lived in retirement with his uncle, till the autumn of 1717, when he prefented himfelf a candidate for the profefforfhip of mathematics in the Marifchal college of Aberdeen, which he obtained; and was afterwards the happy means of reviving the tafte for mathematical learning, and raifing it higher than it had ever been in that univerfity. During the vacations of 1719 and 1721, he went to London, and was, in his firft journey, introduced to Dr. Hoadly, Dr. Clarke, the illuftrious Newton, and feveral other eminent men, whofe notice and friendfhip he ever after reckoned the greateft honour and happinefs of his life. In his firft journey he was admitted a member of the Royal Society: two of his papers were inferted in their Tranfactions, and his book, entitled "Geometria Organica," was publifhed with the approbation of their prefident. In 1721 he became acquainted with Martin Folkes, efq. afterwards prefident of the Royal Society, with whom he cultivated a moft entire and unreferved friendfhip, frequently interchanging letters with him, and communicating all his views and improvements in the fciences. In the following year lord Polwarth, plenipotentiary of the king of Great Britain at the congrefs of Cambray, engaged Mr. Maclaurin to become travelling tutor and companion to his eldeft fon, who was then fet out on his travels. After vifiting Paris and fome other cities and towns of France, they fixed on Lorrain as the place of their refidence, where Mr. Maclaurin gained the efteem of the principal perfons of the court. Here he wrote his piece on the percuffion of bodies, which gained the prize of the Royal Academy of Sciences for 1724. The fubftance of this tract was afterwards inferted in his treatife of Fluxions, and is likewife to be found in the fecond book of his "Account of the Difcoveries of Newton." Shortly after they quitted Lorrain, Mr. Maclaurin's pupil was feized with a fever which terminated fatally, to the great grief of the preceptor, who mourned for him as for a companion and the friend of his heart. He immediately returned to Aberdeen; and was in a fhort time, by the recommendation and intereft of fir Ifaac Newton, chofen affiftant to Mr. James Gregory in the profefforfhip of mathematics at Edinburgh. He foon became a very popular lecturer, and feldom had lefs than a hundred young perfons attending his courfe. Thefe, according to their ftandings in the univerfity, he divided into claffes: in the firft he taught the firft fix books of Euclid's elements, plain trigonometry, practical geometry, the elements of fortification, and an introduction to algebra. With the fecond clafs he entered more largely into algebra, read the 11th and 12th books of Euclid; and inftructed them in fpherical trigonometry, conic fections, and the general principles of electricity. The third advanced in aftronomy and perfpective, and read a part of fir Ifaac Newton's Principia, and had a courfe of experiments for illuftrating them performed and explained to them. He afterwards read and demonftrated the elements of fluxions: with the next clafs he read a fyftem of fluxions; and introduced the pupils to the doctrine of chances, and explained the remainder of Newton's Principia.

Befides the labours of his public profeffion, Mr. Maclaurin was engaged in many other important avocations. If a new or uncommon experiment was faid to have been any where exhibited, the curious among Mr. Maclaurin's friends were defirous of having it repeated by him; or if a comet or eclipfe was to be obferved, his telefcopes were always in readinefs. Amidft all the hindrances which he almoft perpetually was experiencing, he continued to purfue his ftudies with the utmoft affiduity, and took from the ordinary hours of fleep, what he beftowed on his fcholars and friends, a circumftance that is thought to have impaired his health and fhortened his valuable life. In 1733, Mr. Maclaurin married Anne, the daughter of Mr. Walter Stewart, folicitor general to king George I. for Scotland, by whom he had feven children; of thefe, five furvived him. In 1734, Dr. Berkeley, bifhop of Cloyne publifhed his treatife entitled "The Analyft," in which he attempted to overfet the doctrine of "Fluxions," and to charge mathematicians with infidelity in matters of religion. This work was the occafion of Mr. Maclaurin's elaborate Treatife on Fluxions, which was publifhed at Edinburgh in 1742, and which is reckoned the moft complete treatife on that fcience that has even yet appeared. He became a very active and diftinguifhed member of the fociety which had exifted fome years at Edinburgh for the improvement of medical knowledge, but which he contrived to extend more generally to the interefts of fcience in all its branches. In conjunction with Dr. Plummer, profeffor of chemiftry, he was appointed joint fecretary, and generally at the monthly meetings either read fome paper of his own, or communicated the contents of letters received from foreign parts, by which means the fociety was informed of all the new difcoveries and improvements in the fciences. He fhewed his zeal for promoting the interefts of fcience, by projecting the building of an "Aftronomical Obfervatory," and a theatre for experiments in the univerfity, of which he drew an excellent plan, and would probably have carried it into execution by the munificence of private perfons, had not the unhappy diforders of the country intervened. In the year 1739, he was confulted by the earl of Morton with regard to the fettling of the geography of the Orkney and Shetland iflands, which had been laid down in the maps without attention to real facts deduced from aftronomical obfervations. He drew up a memorial of what was neceffary to be done, furnifhed the proper inftruments, and recommended Mr. Short, the celebrated optician, as a fit perfon for managing the affair. From the account which he received of this vifit to thofe iflands, he was made more fenfible than before of the errors in their geographical fituation, which have proved the occafion of numerous fhipwrecks, and he engaged feveral of his old pupils, who were then fettled in the northern counties, to furvey the coafts, expecting, as the refult of their obfervations, to obtain a good map of Scotland. He had at this time another fcheme for the improvement of geography and navigation, which was the difcovery of a paffage from Greenland to the South-fea by the north pole: he was fatisfied that fuch a paffage exifted, and would, if his fituation could have admitted of it, have undertaken the voyage at his own expence. A premium was afterwards offered by government for the difcovery of a north-weft paffage, which did not accord with his views, as he was convinced, from all his reading on the fubject, that it muft lie near the pole. In the year 1745, he took a moft active part in favour of his majefty's government, in oppofition to the rebels who were marching to the fouth. By the fatigue and anxiety to which he was expofed by his exertions in this caufe, he laid the foundation of the difeafe which in a few months put a period to his life. When, however, the rebel army got poffeffion of the city, he thought it advifable to make his efcape into England, well knowing that he could not expect mercy if he fell into the hands of the enemy. As foon as he arrived in the neighbourhood of York, he was invited by the archbifhop to refide with him during his ftay, with which he gladly complied, and on account of which he was impreffed with the deepeft fentiments of gratitude. Upon the march of the rebels into England, he ventured to return to Edinburgh, when it was found his conftitution was completely undermined: and that his diforder had already advanced beyond the reach of medicine. His complaint being the dropfy, he was three times tapped, but the operations proved inefficacious, and he died on the 14th of June 1746, having exhibited, through the progrefs of his difeafe, a difpofition worthy of a philofopher and a Chriftian.

Mr. Maclaurin was not only diftinguifhed by his genius and learning, but by the qualities of the heart: by his fincere love to God and his fellow creatures, and by his univerfal benevolence and unaffected piety. His favourite ftudies were the mathematics, which he cultivated with extraordinary fuccefs. His peculiar merit as a philofopher was, that all his ftudies were accommodated to general utility, and in many parts of his works, there is evidently an application of his moft abftrufe theories to the perfecting of mechanical arts. He had refolved, for the fame purpofe, to compofe a courfe of practical mathematics, and to refcue feveral ufeful branches of the fcience from the treatment which they too frequently meet with in lefs fkilful hands. Thefe defigns were prevented by his death: in his life-time, however, he frequently had the pleafure to ferve his friends and country by his fuperior attainments. If any difficulty occurred concerning the conftruction or perfecting of machines, the working of mines, the improvement of manufactures, &c. Mr. Maclaurin was ever ready to refolve them. He was likewife employed to terminate fome difputes which had arifen at Glafgow concerning the gauging of veffels; and prefented to the commiffioners of excife two elaborate memorials, containing rules by which the officers acted, with

with their demonstrations. He made calculations relative to the fund for the widows of the Scotch clergy, and of the professors in the universities, and contributed very much to perfect the scheme which has been found of eminent utility to a vast number of persons who would otherwise have been left destitute of the means of support. But what seems to have endeared his studies to him, was the use they are of in demonstrating the existence and attributes of the Creator, and establishing the principles of natural religion on a solid foundation. To this use Mr. Maclaurin frequently applied them: and he was equally zealous in the defence of revealed religion, which he would warmly vindicate, whenever he found it attacked either in conversation or writing. Besides the works already mentioned, Mr. Maclaurin was author of many papers in the Philosophical Transactions; "On the Construction and Measures of Curves;" "On Equations with impossible Roots;" "On the Description of Curves," &c. He gave an "Account of the Annular Eclipse of the Sun at Edinburgh in January 1742—3." After his death were published his "Treatise on Algebra," and his "Account of sir Isaac Newton's philosophical Discoveries." The first of these is a capital introduction to the science of which it treats. The author's design with regard to the second seems to have been to explain only those parts of sir Isaac's philosophy which have been, and which were, for some time, controverted, which was probably the reason that his discoveries concerning light and colours were scarcely touched on.

Such was the life of this eminent person, spent in a course of laborious study; in continually endeavouring to be useful; in improving curious and useful arts, and propagating truth, virtue, and religion amongst mankind. "He was," says his biographer, "taken from us at an age when he was capable of doing much more, but has left an example, which will be long admired and imitated, till the revolution of human affairs puts an end to learning in these parts of the world; or the fickleness of men, and their satiety of the best things, have substituted for this philosophy some empty form of false science, and by the one or the other means, we are brought back to our original state of barbarity." Account of the Life, &c. of the Author prefixed to the work last-mentioned.

Maclaurin, John, *Lord* Dreghorn, son of the above, born at Edinburgh in December, 1734, was educated at the grammar-school of Edinburgh, and afterwards went through an academical course at the university of that city. He was admitted a member of the faculty of advocates at Edinburgh in 1756. In 1782, a Royal Society was established in Edinburgh, of which Mr. Maclaurin was one of the original constituent members, and at an early period of the institution he read an Essay to prove that Troy was not taken by the Greeks. In 1787 he was raised from the Scottish bar, at which he had practised long and successfully, to the bench, by the title of lord Dreghorn. He died in 1796. As an author we have "An Essay on Literary Property;" "A Collection of Criminal Cases;" "An Essay on Patronage;" and some poetical pieces: besides which we have in the dramatic line ascribed to him, "Hampden;" "The Public;" and "The Philosopher's Opera." During the years 1792, 3, 4, and 5, lord Dreghorn kept a journal, or diary, in which he recorded the various events that happened in Europe during those years. From this journal he made a selection for publication: and in 1799 a selection of his lordship's works was printed in two vols. 8vo. Biog. Dram.

MACLE, in *Mineralogy*. *Macle basaltique, ou schorl en prism quadrangulaires rhomboidaux*, Romé de l'Isle; *Chiastolit*, Karsten; *Hohlspath*, Werner; *Hollow-spar*, Jameson; *Crucite*, Delameth; *Argilla chiastolithus*, Lat. (not of Forster.)

This remarkable mineral has hitherto been found only crystallized; but its forms are very different from those of all other mineral substances we are acquainted with, and not easily determinable.

It is generally found in long, slightly rhomboidal prisms of a yellowish, reddish or greenish colour; each prism is apparently produced by four tabular or prismatic crystals, externally straight and more or less exactly joined, internally more or less separated from one another: the space thus left in the centre of the prism, and varying both in form and extent, is filled up with a black or bluish-black substance; whence a transverse section of the complete prismatic crystal represents a black nucleus, generally of a slightly rhombic figure, from each angle of which a black line runs towards the opposite angle of the external substance, producing a kind of cross, more or less dilated in the centre, (*Macle tétragramme* of Haüy, pl. 51. f. 219.) and generally equally dilated at its four extremities (Macle *pentarhombique*, Haüy, ib. fig. 220.) Sometimes the same black diagonal lines branch out into other lines, (Macle *polygramme*, Haüy, ib. fig. 221.) In the narrow prismatic variety the black substance forms by far the principal part, appearing in the form of a prism, enclosed in a thin case of the same form, and of a yellowish-white colour.

The black rhombic figure in the centre of the horizontal section of the crystals appears at first sight to belong to a prism; but it is generally the section of a pyramid, as is manifested by the increasing or diminishing size of the rhombic spot, according as the transversal sections are made nearer to one or to the other extremity of the crystal.

The crystals are generally middle-sized, sometimes very narrow and acicular; they sometimes adopt a cylindrical form.

Fracture more or less foliated, with a double cleavage; the principal one parallel to the lateral planes of the prism.

It is translucent on the edges, at least in those crystals that have the appearance of feldspar; those that approach to the nature of steatite are opaque.

Hardness variable, according as the substance exhibits the appearances just mentioned.

Specific gravity 2.9444, Haüy; 2.927, Karsten.

Before the blowpipe it is converted into a whitish scoria; the internal black substance melts into a blackish glass.

This substance has not been subjected to chemical analysis.

Macle occurs imbedded in clay-slate. Mr. Buch suspects that the streaked and spotted appearance of some of the varieties of primitive clay-slate, called *frucht* or *kukuk-schiefer*, is produced, not by hornblende, but by minute crystals of macle or hollow spar.

It is found at Gefrees, in the margraviate of Bayreuth; in ci-devant Brittany, in France; and near St. Jago di Compostella, in Galicia. Those of Brittany are more exactly quadrangular. Some of them have about four and a half lines in diameter, and upwards of three and a half inches in length. Those of Spain are generally much thicker, and of a rounded form. According to Haüy, the external surface both of the Spanish and French macles frequently exhibits something of a pearly lustre.

It has also been observed by Lelièvre and Dolomieu in the valley of Bareges, in the Pyrenees; and by Ramond on the plateau de Troumouse, in the High Pyrenees. This substance has also been found by Mr. Davy in the clay-slate of Cumberland, and in the county of Wicklow in Ireland, where it has likewise been observed by Dr. Fitton. Professor feffor Link has found it in the mica flate of the Serra de Marao in Portugal.

The macle has been mentioned by Boëtius de Boot under the name of *lapis cruciger*. It was applied at his time as an amulet for ftopping hemorrhages, &c ; and even at the prefent day it is ufed for feveral fuperftitious purpofes.

Werner confiders this fubftance as nearly related to feldfpar. Dr. Fitton and Mr. Stephens, in their very interefting "Notes on the Mineralogy of Part of the Vicinity of Dublin," fufpect that a connection exifts between the macle and the andalufite (*Feldfpar apyre* of Haüy); the former gentleman, in particular, has convinced himfelf that colour, fracture, luftre, and other characters obfervable in the cryftalline part of the former fubftance, completely agree with thofe of the andalufite.

Macle, *Criftaux maclés*, *Macled cryftals*, are the names by which feveral mineralogifts, and principally Romé de l'Ifle, have diftinguifhed the cryftals with re-entering angles, formed by the union of two diftinct cryftals, producing the appearance of two halves of one fymmetrical cryftal, which in the act of uniting have turned on each other in fuch a manner, that the planes of the upper part of the one correfpond to thofe of the lower part of the other, or nearly fo. Such cryftals are denominated *criftaux tranfpofés* and *hémitropes* by Haüy; and *Zwillings-kryftalle* by Werner.

MACLIN, Charles, in *Biography*, a native of Ireland, probably born in the county of Weft Meath, of a family named M'Laughlin, which was anglicifed to that by which he was ever afterwards known. He was born about the 1ft of May 1690, and in 1708 abfconding from his mother, then a widow, he came over to England. For fome mifconduct with regard to a female connection he was fent back to Ireland. Here he formed an acquaintance with certain undergraduates of Trinity college, Dublin, and took up the employment of bargeman in that college, read much for the improvement of his mind, and remained in that degraded ftate till he had attained the age of twenty-one. He then came to London, made a connection with a ftrolling company of players, and acted the part of harlequin. After leading an extraordinary courfe of life, he was again reftored to his mother, and returned a penitent to his former ftation in Trinity college. In 1716 he arrived in England for the third time, joined a company of players at Briftol, then attached himfelf to feveral ftrolling companies, and afterwards made his entrè at the theatre in Lincoln's-inn-Fields, where his merit was firft difcovered in a trifling character in Fielding's "Coffee-houfe Politician," which, it is faid, would in any other hands have gone unnoticed. He now for feveral fucceffive feafons performed comic characters, and on the tenth of May 1735, had the misfortune to kill Mr. Hallam, an actor in the fame theatre with himfelf, in a private quarrel. He was brought to trial in confequence; but no malicious intent appearing in evidence he was acquitted. In 1741 he eftablifhed his fame as an actor, in the character of Shylock in "The Merchant of Venice," and by his fine and impreffive manner reftored to the ftage a play which had been forty years fupplanted by lord Lanfdown's "Jew of Venice." The manager and performers having about this time difagreed, Maclin, and feveral of the moft eminent of the company, among whom was Garrick, revolted, and figned a formal agreement, by which they were bound not to accede to any terms which might be propofed to them by the patentee, without confent of the fubfcribers. The feceders applied, but without effect, for the grant of a new patent, of courfe they found themfelves under the hard neceffity of agreeing to the terms offered by the manager, who afcribed the revolt of the players to the influence and fuggeftion of Maclin, and refolved to punifh him for his ingratitude. To the others he was reconciled, but the fentence of eternal banifhment from his theatre was pronounced againft the man who had been once his friend and adviser. A change in the management, by which Mr. James Lacey fucceeded Fleetwood, reftored Maclin to his ufual employment. This was in 1747, and in the following fpring he accepted an invitation from the manager of the Dublin theatre, by which he engaged his fervices for two years, but fcarcely had he gone through the duties of his ftation a fingle month, when he took offence at fome inftances of fuppofed neglect, which ended in a feparation from that concern. After various incidents, he, in 1753, obtained from Mr. Garrick the ufe of his theatre for a fingle night, and took a formal leave of the ftage, in a prologue written for the occafion, in which he introduced his daughter as an actrefs to the protection of the public. He now projected the eftablifhment of a tavern and coffee-houfe which was to make his fortune: this he foon after converted into a debating and fpouting club, under the name of "The Britifh Inquifition:" but Maclin was wholly unfit for the bufinefs of a tavern-keeper, became a prey to every needy and unprincipled villain, and, in Feb. 1755, was feen in the lift of bankrupts. On his examination before the commiffioners every thing turned to his character, except that he had been miferably deficient in prudence, and in the end he paid twenty-fhillings in the pound. He next joined Mr. Barry in founding a new theatre in Dublin, where, however, he did not remain more than two or three years, and in 1759 he returned to London and made an engagement at Drury-lane, at a very confiderable falary, and brought out his farce of Love a-la-Mode, which, though oppofed at firft, was received in London and at Dublin with unbounded applaufe. Maclin in a fhort time transferred himfelf from Drury-lane to Covent Garden theatre, to which he continued uniformly attached. He obtained great and almoft univerfal and unbounded applaufe as an actor in comedy, but in 1773 he was determined to attempt the character of Macbeth in tragedy; in this new line he gave full fatisfaction to his friends, but the public, headed by a few violent fpirits, probably his perfonal enemies, were fo much enraged at his attempting tragedy, that for a long time they would not admit him in his own comic parts, and he was formally difmiffed from the theatre. In 1775 he brought his action againft his opponents, and having obtained a verdict in his favour, he willingly relinquifhed the damages awarded in his favour upon the moft liberal terms, a circumftance which drew from lord chief juftice Mansfield the following handfome and well-turned compliment; "You have met with great applaufe to-day: you never acted your part better." From this period Maclin occafionally performed and paid a vifit to Dublin during Mr. Daly's management. In 1788, and again in 1789, while acting his favourite characters, he fuddenly loft his memory, and in the fecond inftance he refolved to make no other effort; but by the advice of his friends he publifhed by fubfcription his two pieces "The Man of the World;" and "Love a-la-Mode:" by the exertions of Mr. Murphy, who fuperintended the printing, and his other friends, 1500*l.* was raifed, with which an annuity of 200*l.* was fettled on himfelf, and 75*l. per ann.* on his wife, if fhe furvived him.

Mr. Maclin died on the 11th of July 1797, at the age of 107, if he were born at the period before-mentioned, but of this the reader fhould be apprized there were fome ferious doubts entertained. His remains were interred under the chancel of Covent Garden church. Mr. Maclin, fays his biographer, was in his private character a tender hufband, a good father, and a fteady friend. To his firmnefs and refolution

lution in supporting the rights of his theatrical brethren, it was owing that they have been relieved from a species of oppression to which they had been ignominiously subjected for many years, whenever the caprice or malice of their enemies chose to exert itself. We allude to the prosecution which he carried on against a set of insignificant beings, who, calling themselves "The Town," used frequently to disturb the entertainments of the theatre, to the terror of the actors, as well as to the annoyance and disgrace of the public. As a comedian his principal and most important parts were sir Gilbert Wrangle in "The Refusal;" sir Archy M'Sarcasm in his own farce of "Love a-la-Mode;" and sir Pertinax Mac Sycophant in "The Man of the World," written also by himself, and first brought forward in 1781. Maclin also made a fine figure in the character of Shakspeare's Iago; but the part in which he was allowed to shine without a competitor was that of Shylock. Besides the dramatic works already referred to, Maclin wrote a tragedy of "King Henry VII. or the Popish Impostor;" "A Will or no Will;" "The suspicious Husband criticised; or the Plague of Envy;" "The Fortune Hunters;" and some other pieces. Biog. Dram.

MACNEN-ABAD, in *Geography*, a town of Persia, in Segestan; 111 miles S.S.E. of Zareng.

MACOGUA, a fort on the W. coast of Africa, at the mouth of the St. Domingo river. N. lat. 12° 20′.

MACOKETH, or MACOKETCH, *Great*, a river of America, which runs into the Mississippi from the north-west, in N. lat. 42° 23′. *Little Macoketch* falls through the E. bank of the Mississippi about 45 miles above the mouth of the former.

MACOLOE, one of the Querimba islands, in the Indian sea. S. lat. 11° 10′.

MACOMER, a town of the island of Sardinia; 16 miles W. of Bosa.

MACON, a town of France, principal place of a district, and capital of the department of the Saône and Loire, near the Saône; before the revolution the metropolis of a small country called the "Mâconnois," which was formerly a county and the see of a bishop. It contained four churches, a commandery of Malta, seven convents, a college, and an hospital. Its trade is considerable. The place contains in two cantons 5807, and the cantons 20,252 inhabitants, on a territory of $177\frac{1}{2}$ kiliometres, in 28 communes. N. lat. 46° 18′. E. long. 4° 55′.

MACONDEGAY ISLANDS, three small islands in the bay of Gunong-Tellu, on the E. coast of the island of Celebes. S. lat. 0° 30′. E. long 120° 25′.

MACONIA, a town of Pegu; 20 miles S. of Pegu.

MACOPIN, a small river of America, which runs from the S.E. into the Illinois, 18 miles from the Mississippi, 20 yards wide and navigable nine miles in the hills: the shore, which is low, is covered with maple, ash, button-wood, &c.: the land abounds with timber, and is overrun with high weeds.

MACORIZ, a small river on the S. side of the island of St. Domingo; 16 leagues E. of the city of St. Domingo.

MACOTERA, a town of Spain, in the province of Leon; 18 miles E. of Salamanca.

MACOTTO, a town on the S. coast of the island of Luçon. N. lat. 13° 12′. E. long. 123° 8′.

MACOU, a town of Persian Armenia; 75 miles S. of Erivan.

MACOUBA ST. ANN, LE, a town of the island of Martinico. N. lat. 14° 54′. W. long. 61° 17′.

MACOUBEA, in *Botany*, occurs only in Jussieu and Aublet, the former having taken it from the Supplement of the latter author's work on the Plants of Guiana, where it is figured in t. 378.—The only parts of fructification with which they were acquainted, are *Peric.* Capsule orbicular, slightly compressed, sometimes obtusely triangular, of one cell; hollow within-side; rough, reddish and marked with grey spots on the outside. *Seeds* numerous, oblong, incurved, obtuse, convex above, furrowed below, inclosed in a white membrane, and attached to the internal coat of the pericarp. —*M. guianensis* is a *tree* rising to the height of forty feet. Its *wood* is of a greenish-yellow, and in drying has a disagreeable smell. *Leaves* opposite, on footstalks, ovate, acute, entire. *Fruit* as big as oranges, in clusters, at the divarications of the branches. The whole tree abounds with a milky juice.—Aublet found it in the woods of Guiana, bearing fruit in February. Jussieu places *Macoubea* in the natural order of *Guttiferæ* on the authority of Aublet's description.

MACOUCOUA, is the Caribbean name of the plant in question, as we learn from Aublet.—It is noticed by Jussieu as nearly allied to *Ilex*, but figured by Lamarck under its vernacular and generic name.—Aubl. Guian. 88. Lamarck Dict. v. 3. 669. Illustr. t. 75. Juss. 379.—Class and order, *Tetrandria Monogynia*. Nat. Ord. *Rhamni*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, cloven into four, short, acute segments. *Cor.* of one petal, tubular, standing upon the receptacle; tube very short; limb divided into four, roundish lobes. *Stam.* Filaments four, within the divisions of the corolla; anthers roundish, of two cells. *Pist.* Germen superior, very small, roundish; style none; stigma obtuse. *Peric* and *Seeds* unknown.

1. M. *guianensis*. Aubl Guian. t. 34. Lamarck Illustr. t. 75. The only species known. A native of woods in Guiana and Cayenne, flowering in February.—The *trunk* of this tree is thirty or forty feet in height, much branched. *Bark* thick, hard, brittle, white externally. *Leaves* alternate, nearly sessile, polished, oval, obtuse and sometimes ending in a sort of jagged point. *Flowers* corymbose, axillary, on footstalks, white. Fruit unknown.—The natives use the bark of this tree merely for fuel.

MACOURIA, in *Geography*, a river of Guiana, which runs into the Atlantic, N. lat. 5°. W. long. 53° 46′.

MACOWAL, a town of Hindoostan, in the circar of Sirhind; 50 miles N. of Sirhind.

MACOYAQUI, a town of New Mexico, in the province of Mayo; 70 miles E.N.E. of Santa Cruz.

MACPHERSON, JAMES, in *Biography*, a modern writer of some celebrity, was born, in 1738, at Ruthven, in the county of Invernefs. He studied at the universities of Aberdeen and Edinburgh, and while he was a resident at the latter, he published a poem, entitled "The Highlands," which displayed some genius, though undisciplined by good taste. He was intended for the church, but never entered upon its duties. In 1760 he was living as private tutor in the family of Mr. Graham, of Balgowan, and about this time he published "Fragments of Ancient Poetry, collected in the Highlands of Scotland, and translated from the Gaelic and Erse Languages." The singularity of these pieces, the novelty of their style and imagery, and the idea that they were the product of a remote age and rude people, caused them to be received with great interest by many lovers of poetry; and as hopes were given that other works of the same kind might be recovered, a subscription was set on foot to enable Macpherson to leave his employment, and visit the Highlands for that purpose. The result of this mission, or of his own leisure, was the epic poem of "Fingal," and several other pieces, which were said to be composed compofed by Offian, the fon of Fingal, king of the Highlands. An animated controverfy was foon kindled relative to their authenticity: the Scotch were, in general, on the fide favourable to the national honour; but many learned and able writers in the fouthern part of the ifland rejected their claims to the antiquity affumed. The arguments urged againft their authenticity, were drawn from the improbability of the exiftence and prefervation of regular epic poems among an uncivilized people who had not the ufe of letters; the abundance of poetic ornament, and the elevation and delicacy of moral fentiment, together with the freedom from all mixture of puerility and extravagance. Whatever was their origin, they met with a number of enthufiaftic admirers, and were tranflated into feveral languages: they were commented upon by critics, and admitted as evidence of manners, habits, and cuftoms by hiftorians and antiquarians. The blind Offian was placed in company with the blind Homer, and the wild mountains and heaths of the Highlands were converted into claffic ground. The originals were now loudly called for, and indirect promifes made that they fhould appear, till at length the fuppofed tranflator, inftead of convincing or conciliating the fceptical, attempted to filence them by a tone of infolent affumption. The controverfy, however, continued during the life of Macpherfon, and is not, indeed, at this moment completely terminated, there being ftill advocates who juftify the claims of Offian as the real author of the works publifhed under his name. Dr. Aikin, in the General Biography, obferves, that the late mafterly difcuffion of the topic by Mr. Lairy feems to have produced a general opinion, that at leaft the great mafs of the poems is modern fiction; and curiofity is now moftly limited to the enquiry how far it may have had a foundation in the traditionary ftories ftill current in the Highlands. In 1764, Mr. Macpherfon was taken by governor Johnftone to Penfacola, in Florida, as his fecretary. After executing his office in fettling the government of that colony, he vifited feveral of the Weft India iflands, and fome of the North American provinces, and returned in 1766. Refuming his literary purfuits, he publifhed, in 1771, "An Introduction to the Hiftory of Great Britain and Ireland," which is elegantly written, and contains much valuable matter. He next publifhed a fort of profe tranflation of Homer, which obtained for him neither fame nor profit, and was foon difmiffed to total oblivion. He now devoted himfelf wholly to hiftorical and political compofition, and in 1775 publifhed "The Hiftory of Great Britain from the Reftoration to the Acceffion of the Houfe of Hanover," in two volumes, quarto. This was at the fame time accompanied with two other volumes of original papers, ferving as documents and authorities for the hiftory. Although the author difcovered a confiderable predilection for the Stuart family, and appeared to place too much confidence in the reprefentations of facts made by James II. in the manufcript memoirs of his own life, yet it certainly made a valuable addition to the knowledge of that period of Englifh hiftory. Mr. Macpherfon next engaged in political warfare, and when the refiftance of the Americans called forth the pen, as well as the fword of authority, he was engaged as one of the ableft. He publifhed a pamphlet, entitled "The Rights of Great Britain afferted againft the Claims of the Colonies," for which he obtained great credit, on account of the ftyle and argument: it was very induftrioufly circulated by the agents and adherents of government. This was printed in 1776, and in 1779 he wrote "A Short Hiftory of the Oppofition during the laft Seffion of Parliament," which was highly commended. His fervices were not neglected, and he received from thofe, whofe caufe he vindicated, the lucrative poft of agent to the nabob of Arcot, whofe concerns with the Eaft India company were, at that period, very perplexed. Mr. Macpherfon did not receive the emoluments without performing the duties of his office, and wrote feveral appeals to the public in behalf of this potentate; and it being judged neceffary that the nabob fhould have a reprefentative in the houfe of commons, he was returned, in 1780, to ferve in parliament for the borough of Camelford, and was re-elected in 1784 and 1790. After this we find that his health was in a declining ftate, he retired to a feat which he had built, called Bellevue, near Invernefs, where he died, in February 1796. His remains were depofited in Weftminfter Abbey: he bequeathed 300*l.* to be laid out in a monument of him, to be erected at Bellevue; and 1000*l.* to defray the expence of printing and publifhing the original Offian. Gen. Biog.

MACPHERSON'S *Strait*, in *Geography*, a channel in the Mergui Archipelago, between Banks's ifland and St. Sufanna. N lat. 10° 37'.

MACQUER, JOSEPH, in *Biography*, a phyfician and eminent chemift, was born at Paris in 1710, and became a doctor of the faculty of medicine in the univerfity of that metropolis, profeffor of pharmacy, and cenfor-royal. He was, likewife, a member of the Academies of Sciences of Turin, Stockholm, and Paris, and conducted the medical and chemical departments of the Journal des Sçavans. He had the merit of purfuing chemiftry, not fo much with a view of multiplying the preparations of pharmacy, which had conftituted the leading enquiries of experimentalifts before his time; but engaged in it as a department of natural philofophy, and gained a confiderable reputation by the publication of feveral ufeful and popular works on the fubject. In fact, he was one of the moft fuccefsful cultivators of the fcience, upon rational principles, previous to the new modelling which it has received within the laft twenty-five years. He died in 1784. The following is a lift of his publications: 1. "Elemens de Chymie Theorique," 1749—1753, 12mo. 2. "Elemens de Chymie Pratique," two volumes, 12mo. 3. "Plan d'un Cours de Chymie experimentale et raifonnée," 12mo., 1757. This was compofed in conjunction with M. Baumé, who was affociated with him in his lectures. 4. "Dictionnaire de Chymie," two volumes, 8vo., 1766. Thefe works have all been tranflated into Englifh and German; the Dictionary particularly by Mr. Keir, with great additions and improvements. 5. "Formulæ Medicamentorum Magiftralium," 1763; and he had alfo a fhare in the compofition of the "Pharmacopeia Parifienfis," of 1758. Eloy Dict. Hift. de la Méd. Gen. Biog.

MACQUER, PHILIP, an hiftorical writer, was born at Paris in 1720. He was brought up to the bar, but the weaknefs of his conftitution prevented him from taking an active part in his profeffion, and he accordingly devoted himfelf to literary occupations. His principal works were "Abregè Chronologique de l'Hiftoire Ecclefiaftique," three volumes, 8vo., compofed after the manner of Hefnault's Chronological Hiftory of France; "Les Annales Romains;" and "Abregè Chronologique de l'Hiftoire d'Efpagne et de Portugal," two volumes, 8vo. He had a fhare in the "Dictionnaire des Arts et Metiers," and other confiderable works. He died in 1770, leaving behind him an excellent character for fimplicity and unaffected integrity.

MACREUSE, in *Ornithology*, the *Anas Nigra*, Scoter or Black Diver. See DUCK.

MACRI, or MACARI, in *Geography*, a town of Afiatic Turkey, in Natolia, in a bay of the Mediterranean, called the gulf of Macri, anciently "Glaucus Sinus;" 70 miles S.W. of Satalia. N. lat. 36° 58'. E. long. 29° 30'.

 MACRIANUS,

MACRIANUS, Titus Fulvius Julius, in *Biography*, an Egyptian of obfcure birth, who, from a private foldier, rofe to the higheft command in the army, and proclaimed himfelf emperor when Valerian had been made prifoner by the Perfians, A.D. 260. He maintained his ufurped power by the influence of his liberality: his two fons, Macrianus and Quietus, were invefted with the imperial purple, and during a fhort period the enemies of Rome were feverally defeated either by the emperors or their generals. When he had fupported his dignity for a year in the Eaftern parts of the world, Macrianus marched towards Rome to crufh Gallienus, who had been proclaimed emperor. He was defeated in Illyricum by the lieutenant of Gallienus, and put to death, with his fon, at his own defire.

MACRINUS Opilius, a native of Cæfarea, in Africa, who from the loweft origin rofe to the high dignity of emperor of the world. He is faid to have been a flave, and to have exhibited in public fhows in the character of a gladiator, which facts have been doubted, as he raifed himfelf to reputation as a pleader in the courts. He became the fteward of Plautianus, the minifter of Severus, and on his difgrace and fall he narrowly efcaped with his life, and was banifhed to Africa, where he maintained himfelf by the united profeffions of rhetorician, pleader, and counfellor. After fome abfence he was recalled from his exile by Severus, who made him poft-mafter on the Flaminian way. Caracalla afterwards created him a Roman knight, and he rofe through the different employments to the high office of pretorian-prefect, an office which he filled with honour and integrity. He at length became an object of the emperor's fufpicions, and faw, or imagined that he faw, his own fafety entirely depended upon ftriking the firft blow, and accordingly engaged a difcontented foldier to ftab the tyrant, which he effected. He immediately fucceeded to the vacant throne by an election of the foldiers in the year 217, and the fenate confirmed the choice of the military. Macrinus was not deftitute of qualities and principles worthy of his high ftation, and by the punifhment of informers, and the refpect which he himfelf paid, and which he caufed others to pay to the laws, he reftored tranquillity to his country. Thefe promifing appearances did not long continue, and the timidity which Macrinus betrayed in buying a peace of Artabanus, the Parthian, by a large fum of money, rendered him odius to his fubjects, and while he affected to imitate the virtuous Aurelius, without poffeffing the good qualities of his heart, he became contemptible and infignificant. The army, who had raifed Macrinus to the purple, now took a decided part againft him; the whole army mutinied, and their tumult was increafed by the confcioufnefs of their power and numbers. At this time the young Bafianus was produced as the natural fon of Caracalla, and was declared emperor by the army. Macrinus, at firft, was refolved to oppofe his competitor: the two armies met, and a bloody battle enfued: the fortune of the day remained fome time very dubious, when Macrinus, who might probably have been victorious had he been firm and fteady, fhamefully fled, leaving his enemies in poffeffion of the field, and eventually of the crown. He paffed through Antioch, croffed Leffer Afia in difguife, and arrived at Chalcedonia with the intention of paffing over into Europe; but being there recognifed, he was feized and conveyed towards Cappadocia. On the road news was brought him that his fon had been taken prifoner and put to death, which fo enraged him, that he leaped from the chariot, and in the fall broke his arm; the guards, dreading the lofs of their captive, inftantly difpatched him, and carried his head to his rival. This circumftance happened in the month of June 218, after a reign of fourteen months. Hiftorians mention, to the honour of this emperor, that he meditated a great reform in jurifprudence, by abolifhing all thofe imperial refcripts which had obtained the authority of laws, though often iffued on particular occafions, and dictated by the caprice of the prince on the throne; but the fhortnefs of his reign prevented the execution of this and other plans which he had devifed for the public good. Gibbon. Crevier.

Macrinus, Salmoneus, a modern Latin poet, whofe proper name was John Salmon, was born at Loudun, and flourifhed in the fixteenth century. He obtained fo high a reputation as a poet, efpecially in the clafs of Lyrics, that he was called the Horace of his time. He was appointed preceptor of the two fons of René, of Savoy, and acquitted himfelf fo well in this employment, that he was received at court, and acquired the friendfhip of feveral of the principal perfons who frequented it. He wrote a great number of verfes, of which fome of the beft are thofe to his wife. He died in the year 1557. Several of his poems are contained in the fecond volume of the "Deliciæ Poetarum Gallicorum:" and a collection of his felect hymns was printed by R. Stephanus. He had a fon Charles, who is faid to have furpaffed his father in his knowledge of the Greek language, and to have equalled him in his Latin poetry. He was appointed preceptor to Catharine of Navarre, fifter of Henry IV., and unfortunately perifhed in the bloody maffacre of St. Bartholomew. Moreri.

MACROBIUS, Aurelius Theodosius, a Latin writer and eminent critic, who flourifhed towards the clofe of the fourth century, is fuppofed to have been a Greek, but the place of his birth is unknown. He is, indeed, claimed by the people of Parma, who fhew his tomb, but he refers his birth-place to a country in which the Latin language was not vernacular. He undoubtedly lived at Rome, but it is not known whether he was the fame Macrobius who was great chamberlain under Honorius and Theodofius II. It has likewife been difputed whether he was with regard to his religion a Chriftian or Pagan. The fuppofition that he held the office of chamberlain under the Chriftian emperors has been the chief, or, perhaps, the only ground for imagining him to have been a Chriftian, fince the language of his writings and the interlocutors in his dialogue are entirely heathen. He wrote a Commentary on Cicero's "Dream of Scipio," from which it appears he was a Platonift: and a dialogue, entitled "Saturnalia," or Mifcellanies, which was fuppofed to have been written at a feftival of Saturn, by a company of learned perfons, whofe names are thofe of fome of the moft learned fcholars of that time. The queftions treated of related to topics of antiquity, mythology, hiftory, and poetry, difcuffed in a pleafing way, and with references to the works of ancient authors, and to the laws and cuftoms of the Romans; and although the ftyle is not pure, and the arrangement cannot be commended, yet it is a work of confiderable merit, and of much utility as a help to claffical erudition, and as containing fome curious obfervations on the two greateft epic poems of antiquity. The beft editions of this author are thofe of the Variorum; and Gronovius in 1670, and Leipfic in 1777. Macrobius has been regarded and cenfured as a plagiarift, but without juft reafon, as he exprefsly mentions, in his preface, an intention of borrowing from any exifting authors whatever might fuit his purpofe.

Many of the works of Macrobius are ftill preferved, among others, his Commentary on Cicero's *Somnium Scipionis*, and his Saturnalia, in feven books. In this laft work there are many interefting paffages concerning ancient mufic.

MACROCE-

MACROCEPHALUS, in *Natural Hiſtory*, a genus of inſects of the order Hemiptera. The generic character is, that it has an inflected ſnout; the ſheath is one-valved, three-jointed, and furniſhed with three briſtles; it has neither jaws, feelers, nor lip; the antennæ are projecting, very ſhort, ſubmoniliform, clavate; the head is oblong, cylindrical above; the ſcutel, which is as long as the abdomen, is depreſſed and membranaceous. There is but a ſingle

Species.

Cimicoides, which is found in North America, and is rather leſs than the Cimex eroſus: the body is of a ferruginous grey; the ſcutel is of a pale aſh colour with a yellow ſpot; the under wings are purpliſh-violet, and the foreſhanks are thickened

Macrocephalus, Μακροκεφαλος, compounded of μακρος, *great*, and κεφαλη, *head*, denotes a perſon with a head larger or longer than the common ſize.

Macrocephali, or *long-heads*, is a name given to a certain people, who, according to the account of authors, were famous for the unſeemly length of their heads; yet cuſtom ſo far habituated them to it, that inſtead of looking on it as a deformity, they eſteemed it a beauty, and as ſoon as the child was born, moulded and faſhioned its head in their hands to as great a length as poſſible, and afterwards uſed all ſuch rollers and bandages as might ſeem moſt likely to determine its growing long.

MACROCERCI, the name eſtabliſhed by Dr. Hill for a large genus of animalcules, diſtinguiſhed from all others by having tails longer than their bodies. See Animalcule and Vorticella.

MACROCNEMUM, in *Botany*, from μακρος, *long*, and κνημη, *a leg*, alluding, as it ſeems, to the long ſtalks by which its cluſters of flowers are ſupported. Browne Jam. 165. Linn. Gen. 90. Schreb. 120. Willd. Sp. Pl. v. 1. 933. Mart. Mill. Dict. v. 3. Juſſ. 200.—Claſs and order, *Pentandria Monogynia*. Nat. Ord. *Rubiaceæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of one leaf, turbinate, five-toothed, permanent; often bearing a foliaceous, ſtalked, internal appendage. *Cor.* of one petal, tubular; its limb ſmall, in five ovate, ſlightly ſpreading ſegments. *Stam.* Filaments five, awl-ſhaped, villoſe, ſhorter than the corolla; anthers ovate, compreſſed, in the mouth of the flower. *Piſt.* Germen inferior, conical; ſtyle ſimple, the length of the ſtamens; ſtigma thickiſh, two-lobed. *Peric.* Capſule oblong, ſomewhat turbinate, two-celled, and two-valved, burſting lengthwiſe, the partitions from the middle of each valve. *Seeds* numerous, imbricated, on a ſeparate linear receptacle in each cell.

Eſſ. Ch. Corolla tubular, five-cleft. Capſule inferior, oblong, of two cells; the valves burſting longitudinally, with partitions from their centre. Seeds imbricated.

Obſ. This genus is allied to *Cinchona*, but differs eſſentially in the ſtructure of its capſule. Its great peculiarity conſiſts in the large, leaf-like, coloured, ſtalked, ſolitary appendages, placed within the calyx, and according to Jacquin, in his *Hortus Schoenbrunenſis*, originating from the very baſe of the germen, between two teeth of the calyx; but theſe, which might eaſily be miſtaken for bracteas, are not found in every ſpecies, nor in every flower of any one. The original ſpecies is deſtitute of them.

1. M. *jamaicenſe*. Linn. Sp. Pl. 244. Swartz. Obſ. 68. t. 3. f. 1.—Corymbs on long axillary ſtalks. Calyx without an appendage. Native of ſhady places, about the banks of rivers, in the ſouthern part of Jamaica. A branched ſmooth ſhrub, with long, lax, round ſcarred *branches*. *Leaves* oppoſite, ſtalked, a ſpan long, elliptic-oblong, pointed, entire, ſmooth, crowded about the ends of the branches; paler beneath. *Flowers* yellowiſh-green, in long-ſtalked corymboſe panicles. *Fruit* near an inch in length.

2. M. *ſpecioſum*. Jacq. Hort. Schonbr. v. 1. 19. t. 43.—Corymbs ſhorter than the leaves, hairy. Calycine bractea roundiſh-ovate, its ſtalk ſhorter than the corolla.—Native of the Caraccas. Jacquin had it flowering in his ſtove in December. This is a moſt beautiful ſhrub, five feet high, its *infloreſcence*, and even the *calyx* and *corolla*, downy or hairy, as well as the margins of the *leaves*. The axillary and terminal corymboſe *panicles* compoſe a large tuft of *flowers* at the end of each branch, very conſpicuous for the long purple-mouthed *corolla*, and the large roſe-coloured, veiny, ſmooth or downy, appendage to the *calyx* of moſt of them, more ſplendid than the flowers themſelves.

3. M. *candidiſſimum*. Vahl. Symb. v. 2. 38. t. 30.—Corymbs ſhorter than the leaves, ſmooth. Calycine bractea roundiſh-ovate, its ſtalk longer than the corolla.—Found by Von Rohr in the neighbourhood of St. Martha.—This differs from the laſt in its ſmaller ſize, and white calycine *bractea*, whoſe ſtalk exceeds the *flower* in length. The *corolla* is alſo of a ſhorter figure. *Capſule* elliptic-oblong, compreſſed.

4. M. *coccineum*. Vahl. Symb. v. 2. 38. t. 29.—Corymbs denſe, the length of the footſtalks, in long cluſters. Calycine bractea elliptical, its ſtalk much longer than the corolla.—Native of Trinidad. *Von Rohr.* A *tree* with hairy *branches*. The *leaves* are from one to two feet long, elliptic-obovate. *Corymbs* ſhort and denſe, diſpoſed in very long cluſters. One *flower* in each corymb is furniſhed with a very large, elliptical, long-ſtalked, ſcarlet calycine appendage, looking, at firſt ſight, like a *bractea* to each. The *corolla* is ſmooth, its limb nearly as long as its tube. *Germen* hairy.

5. M. *ſtrictum*. Roxb. MSS.—Flowers in little denſe, round, axillary heads, ſhorter than the footſtalks.—Native of Bengal. *Herb. Banks.* The *branches* are ſmooth and angular. *Leaves* only two or three inches long, elliptical, pointed. *Flowers* ſmall, without calycine bracteas.

Some ſpecies of this curious genus ſtill, we believe, remain unſettled.

MACROCOLUM, or Macrocollum, formed of μακρος, *large*, and κολλαω, *I join*, among the Romans, the largeſt kind of paper then in uſe. It meaſured ſixteen inches, and frequently two feet.

MACROCOSM, Μακροκοσμος, compounded of μακρος, *long*, *large*, and κοσμος, *world*, denotes the great world, that is, the univerſe.

In which ſenſe it ſtands contradiſtinguiſhed from microcoſm, a term uſed to expreſs man.

MACRODESPOUR, in *Geography*, a town of Bengal; 20 miles E.S.E. of Kiſhenagur.

MACROLOBIUM, in *Botany*, was ſo named, as Profeſſor Martyn ſuggeſts, from having one of the petals very long in proportion to the others, but we are rather inclined to conſider it as derived from μακρος, *large*, and λοβος, *a pod*; the large ſeed-veſſel moſt evidently warranting ſuch an application of the name, which was given by Schreber with Aublet's plates before him. Schreb. 30. Willd. Sp. Pl. v. 1. 186. Vahl. Enum. v. 2. 37. Mart. Mill. Dict. v. 3. (Outea; Aubl. Guian. 28. Juſſ. 347. Lamarck Illuſtr. t. 26.—Vouapa; Aubl. Guian. 25. Juſſ. 350. Lamarck Illuſtr. t. 26.)—Claſs and order, *Triandria Monogynia*. Nat. Ord. *Lomentaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, double; the outer of two, oppoſite, ovate-oblong leaves, adhering to the baſe of the

the inner, which is of one leaf, turbinate, ſhort, with an oblique, five-toothed margin. *Cor.* Petals five, unequal; the upper one large, erect, unguiculate, oblong, obtuſe, concave, undulated, inſerted into the inner perianth; lower petals four, ſmall, ovate, ſpreading, attached to the upper part of the inner perianth. *Stam.* Filaments four, one of them ſhort, barren, ſtanding under the large petal; the reſt very long, thread-ſhaped; anthers ſquare. *Piſt.* Germen ſuperior, ſtalked, ovate; ſtyle thread-ſhaped; ſtigma obtuſe. *Peric.* Legume ovate, compreſſed, coriaceous, of one cell. *Seed* ſolitary, roundiſh, compreſſed.

Eſſ. Ch. Calyx double: the outer of two leaves; the inner turbinate and obliquely five-toothed. Corolla of five petals, unequal. Legume ſingle-ſeeded.

Obſ. Schreber remarks that *Outea* and *Vouapa* of Aublet do not ſeem to be diſtinct genera, as the corolla, fertile ſtamens and the piſtil agree in number, form, and ſituation in both. In the former indeed, *Outea*, Aublet had never ſeen the ripe fruit, and in the latter he appears not to have diſtinguiſhed the leſſer petals from the calyx. Vahl, however, has kept theſe genera diſtinct, on the authority of Richard.

1. M. *pinnatum*. Willd. (Outea guianenſis; Aubl. Guian. t. 9.)—Leaves pinnate, obtuſe.—Native of woods and foreſts in Guiana, flowering in May. - The *trunk* of this tree riſes to the height of fifty feet, and is about a foot in diameter. *Bark* ſmooth and greyiſh. *Wood* whitiſh towards the ſurface, but red at the heart. *Branches* ſpreading, inclining, the upper ones erect. *Leaves* abruptly pinnate, alternate; leaflets four, ovate, obtuſe. *Stipulas* two, acute, ſmall, deciduous, at the baſe of the common ſtalk. *Flowers* in ſpikes, axillary, of a violet colour. Some eminent botaniſts have ſuſpected that this may be a *Tamarindus*, and the following a *Hymenæa*.

2. M. *hymenæoides*. Willd. Vahl. (Vouapa bifolia; Aubl. Guian. t. 7.)—Leaves binate, pointed, oblique at the baſe. Legume oblong. Found in the woods of Guiana and Cayenne, near the ſhores of lakes and rivers, flowering in November and bearing fruit in January. - A *tree* ſixty feet high, much branched at the top. *Leaves* alternate, of two green, ſtrong, and thick, oval, long-pointed leaflets. *Flowers* in ſolitary, terminal cluſters from the boſom of the leaves, of a pale violet colour.

3. M. *ſphærocarpum*. Willd. Vahl. (Vouapa Simira; Aubl. Guian. t. 8.)—Leaves binate, pointed, ovate. Legume roundiſh compreſſed.—Native of woods at Courou, in Guiana, bearing fruit in June. The height of this *tree* is eighty feet. *Trunk* thick, much branched at the top. *Leaves* alternate of two ovate, entire leaflets, reticulated with veins. The *flowers* have not been ſeen, but the *fruit* grows in axillary cluſters, and is a thick, roundiſh, leathery, ferrugineous legume, of one cell and two valves, containing a ſolitary, roundiſh, depreſſed, ſmooth *ſeed*. The *wood* is violet-coloured.

MACROLOGY, Μακρολογια, formed of μακρος, *long*, and λογος, *diſcourſe*, in *Rhetoric*, a redundant, or too copious ſtyle; an example of which we have in Livy, lib. viii. "Legati non impetrata pace, retro domum, unde venerant abierunt."

The too copious is equally ſubject to obſcurity with the too conciſe ſtyle, and conſequently ought to be avoided. See BRACHYOLOGY, DICTION, and STYLE.

MACRONISI, in *Geography*, a ſmall iſland in the Turkiſh Archipelago, near the coaſt of Livadia; formerly called Helena, becauſe it is ſaid to have afforded an aſylum to that princeſs. It was anciently very populous, but is now deſerted, and only occupied by lizards or other reptiles. In the interior parts are found many rare plants; 6 miles N.E. of cape Calonni. N. lat. 37° 38'. E. long. 24° 17'.

MACROPEDIUM, the *long-legs*, a name given by ſome writers in natural hiſtory to the common tipula.

MACROPIPER, a name given by authors to the *piper longum*, or long pepper.

MACROPNUS, formed of μακρος, *long*, and πνοη, *breath*, a word uſed by Hippocrates, and other old writers in medicine, to ſignify a perſon who fetches his breath at long intervals. It is uſed in oppoſition to *brachypnus*, or ſhort-breathed.

MACROPTERA, derived from μακρος, *long*, and πτερον, *a wing*, in *Ornithology*. The hawks of this genus have their wings ſo long, that when cloſed they reach to the end of the tail, or nearly ſo. Of this genus are the bald-buzzard, the kite, the hen-harrier, the honey-buzzard, and the common buzzard, the ſacre, the jerfalcon, &c.

MACROPUS, KANGUROO, in *Natural Hiſtory*, a genus of the claſs and order Mammalia-feræ. The fore-teeth in the upper jaw ſix, and emarginated; but in the young animal they are eight; there are only two in the lower jaw, very large, long, ſharp, and pointing forwards: there are five grinders on each ſide, both in the upper and lower jaw, diſtant from the other teeth; the fore-legs are very ſhort; and the hind ones very long; the female has an abdominal pouch. There are two ſpecies, *viz.* the major, or M. *giganteus*, anſwering to the Didelphis gigantea of Linnæus; and the M. *minor*, or the kanguroo rat.

This genus, as it appears from what has been ſaid, has hitherto been generally confounded with the *Didelphis*, which ſee: it is, however, found eſſentially to diſagree with that genus in reſpect to the teeth and other particulars: hence Dr. Shaw, and other later naturaliſts, have ſeparated it from the Didelphis tribe.

Of all the animals which the continent of Auſtralaſia has preſented to our view, the *Platypus* excepted, (which ſee) the kanguroo muſt be conſidered as the moſt extraordinary: "its ſize, conformation, teeth, and other particulars, conſpiring to render it a moſt intereſting object to every naturaliſt."

Species.

MAJOR; Great kanguroo. Browniſh, with ſharp ears and pentadactylous fore feet. This animal was firſt diſcovered by captain Cook's people, while at Botany Bay, in New Holland, in the year 1770, an intereſting account of which is given in the captain's firſt voyage. It is thus deſcribed by Dr. Shaw: "The general ſize of the kanguroo is at leaſt equal to that of a full-grown ſheep: the upper parts of the animal are ſmall, while the lower are remarkably large in proportion; yet ſuch is the elegance of gradation in this reſpect, that the kanguroo may juſtly be conſidered as one of the moſt pictureſque of quadrupeds. The head bears ſome reſemblance to that of a deer, and the viſage is mild and placid; the ears are moderately large, of a ſharpened form, and upright; the eyes large; and the mouth rather ſmall; the neck is thin and finely proportioned; the fore-legs are extremely ſhort, with the feet divided into five toes, each of which is furniſhed with a ſharp and ſomewhat crooked claw. From the breaſt downwards the body gradually enlarges, and again decreaſes a little towards the tail; the thighs and hind-legs are extremely ſtout and long; and the feet are ſo conſtructed as to appear, at firſt ſight, to conſiſt of but three toes, of which the middle one is by far the largeſt, and is furniſhed with a claw of great ſize and ſtrength; the exterior toe is alſo furniſhed with a very ſtrong claw, but far ſmaller than that of the middle; and the interior conſiſts of two ſmall toes united under a common ſkin, with their reſpective claws placed ſo cloſe to each other

other as to appear like a split or double claw: the whole appearance of the foot bears a distant resemblance to that of a bird. The great kanguroo rests on the whole length of the foot, which is callous, blackish, and granulated beneath. The colour of the animal is an elegant pale brown, lighter, or more inclining to whiteness on the abdomen; the ventral pouch, or receptacle for the young, is situated as in the didelphis tribes, and is extremely large and deep." The dimensions of a full-grown kanguroo are these: eight feet from the tip of the nose to that of the tail; length of the tail three feet one inch; of the head eleven inches; of the fore-legs two feet; of the hind three feet seven inches; circumference of the fore-part of the animal, near the legs, three feet nine inches; of the lower part, near the legs, four feet five inches; round the thickest end of the tail thirteen inches. The weight of the largest specimens is said to be 150lbs., but it is thought to attain a still larger size. "Though the general position of the kanguroo, when at rest, is standing on its hind-feet, yet it frequently places its fore-feet on the ground also, and thus feeds in the manner of other quadrupeds. It drinks by lapping. In its natural state it is extremely timid, and springs from the sight of mankind by vast bounds of many feet in height, and to a surprising distance. The female kanguroo has two mammæ, situated in the abdominal pouch, and on each side are seated two teats; yet, so far as has hitherto been observed, the animal produces but one young at a birth, and so exceedingly diminutive is the young, when first found in the pouch, as scarcely to exceed an inch in length. The young continues in the pouch till it is grown to a large size, and takes occasional refuge in it long after it has been accustomed to come abroad. It feeds on vegetable substances, and chiefly on grass. In their native state, kanguroos are said to feed in herds of thirty and forty together, and one is usually stationed, as if apparently on the watch, at a distance from the rest. One of the most remarkable peculiarities of this animal is its power of separating at pleasure, to a considerable distance, the two long fore-teeth in the lower jaw. The *Mus maritimus*, it must be observed, does the same. It is thought that there are several varieties of the great kanguroos; some being of a much darker colour than the common kanguroo described, and have a coarser fur. This animal may now be considered as, in a great degree, naturalized in England; several having been kept some years in Richmond park, where they have bred. The flesh of the kanguroo is coarse, and will not be eaten as a luxury; but will serve in case of scarcity to persons in their foreign travels.

Minor, Lesser, or brown kanguroo. Ash-coloured beneath, with rounded ears, and tetradactylous fore-feet. This species of animal has, from its colour and general aspect, obtained the title of kanguroo-rat; it is about the size of a rabbit; the tail is long, tapering, hairy; hind-legs long, three-toed; ears rounded; eight upper fore-teeth, the two middle ones sharper; the lower two long and pointed; three grinders on each side, the fore-most channelled; fur smooth, dark-brown. The structure of the hind-feet in this species perfectly resembles that of the great kanguroo. The female is furnished with an abdominal pouch for the reception of the young. Some of this species were imported in a living state from New Holland.

MACRORYNCHÆ, *long-beaked*, derived from μακρος, *long*, and ῥυγχος, *a beak*, in *Ornithology*, the character of a large order of the bird kind.

The birds of this order have all of them beaks many times longer than their heads, with oblong nostrils, and a furrow running from them towards the apex of the beak.

MACROTELOSTYLA, in *Natural History*, the name of a genus of crystals, which are composed of two pyramids, joined to the end of a column; both the pyramids, as also the column, being hexangular, and the whole body consequently composed of eighteen planes.

The word is derived from the Greek μακρος, *long*, τελειος, *perfect*, and στυλος, *a column*; expressing a perfect crystal with a long column.

There are only three known species of this genus. Either of the sorts found with us, are called by the common name of *Cornish diamonds*.

MACROULE, in *Ornithology*, the name given by many to the largest species of coot. It is of a deeper black than the common kind, and has a large bald spot on its head. It is also called by some *diable de mer*. It is found in Lancashire and Scotland. See Fulica *Aterrima*.

MACROURUS, in *Natural History*, a genus of fishes of the order Thoracici. There is but a single species, which is reckoned by Gmelin as belonging to the genus Coryphæna. We have, however, in that article, given reasons why it cannot be admitted in that tribe; instead, therefore, of denominating the fish under consideration the Coryphæna *Rupestris*, we follow Dr. Shaw, and others, in naming it the

Macrourus *Rupestris*, or Long-tailed Imminset, of which the generic character is, head large, eyes large; body at the hind part attenuated into the tail.

The head of this remarkable fish is large and thick: the upper jaw projecting above into the form of an obtuse snout; the eyes are very large, the mouth wide, with five rows of small curved teeth in the upper jaw, and two rows in the lower; the tongue is white, thick, short, and cartilaginous; beneath the tip of the lower jaw hangs a beard or cirrus; the body tapers from the middle part, and at length is continued into a very long, slender, and pointed tail; the whole fish is covered with moderately large rounded scales, each of which is furnished with a strong toothed carina, ending in a pointed tip, which causes a remarkable roughness of surface; so that the hand is wounded by drawing it over the fish from the tail towards the head. The first dorsal fin is situated near the middle of the back, and is furnished with nine or ten rays. The second dorsal fin commences at a small distance from the first, and running to the tip of the tail is united with the vent fin, which is likewise continued from the tip of the tail to the vent, near the middle of the body. The colour of this fish is a silvery-grey, deepest on the upper parts; its usual length is about three feet, but is occasionally seen of a larger size. It is a native of the Northern seas, and is mostly found about the coasts of Greenland and Iceland, and is numbered among the edible fishes of the Greenlanders. It swims swiftly, and when first taken, it struggles with great violence, endeavouring to defend itself by lashing with its tail; its large eyes projecting, at the same time, to a surprising degree. It is known in some places by the name of Berg-lax, or Mountain Salmon; and the Greenlanders call it "Ingminniset," from which the English generic name has been taken. Shaw's Zoology.

MACSOUD-BEGUI, in *Geography*, a town of Persia, in the province of Irak; 54 miles E.S.E. of Ispahan.

MACSWINE's Bay, a bay of Ireland, in the N. part of Donegal bay; 11 miles W. of Donegal. N. lat. 54° 36′. W. long. 8° 17′.

MACTEN, one of the smaller Philippine islands, in which, as some say, Magellan was killed. N. lat. 10° 30′. E. long. 123° 48′.

MACTRA, in *Natural History*, a genus of the class Vermes, and order Testacea, is thus described: the animal is

 a *Tethys*,

a *Tethys*, which fee; fhell bivalve, unequal-fided, equivalve; middle tooth of the hinge complicated, with a fmall hollow on each fide, lateral ones remote, and inferted into each other. There are twenty-feven fpecies inhabiting the coafts of all quarters of the world, and four of them, as will be noticed by afterifks in the article, are found on our own coafts. They are of different fizes, from that of a man's hand, downwards, fo that fome of them are fcarcely an inch broad. The fhells are likewife exceedingly different, fome being fmooth, others wrinkled; fome are wedge-fhaped, others ovate; they are alfo diaphanous, pellucid, and femi-tranfparent; fome are ftriate, banded, white or fawn-coloured, and fome refemble a *tellina*, others a *mya*. The following is a brief enumeration of the feveral

Species.

Spengleri. The fhell of this is fmooth, with a flat anterior margin, on which is a lunate gape; it is found at the Cape of Good Hope, nearly as large as a man's hand, and is a little gaping, pale, fub-diaphanous, fub-triangular. The gape, before the hinge, is lunate, acute, and reaching to the hollow of the hinge; the beaks are incurved, and the teeth of the hinge triangular.

Plicatoria. Shell with tranfverfe wrinkled plaits, diaphanous; the anterior margin is flattifh; behind the beaks is a compreffed oblong gape. It is found in the Indian ocean, and is from one to two inches long, and two inches and a half broad. The fhell of this fpecies is thin as paper, with fmooth lanceolate depreffions on each fide the hinge; the anterior one flattifh, with a ridge near the beaks; the pofterior impreffed, and more ovate; beaks incurved; lateral teeth of the hinge compofed of two parallel membranes.

Papyracea. Shell very thin, pellucid, and white; it is convex, the fore-part a little gaping, very finely ftriate, and ribbed. It is found in the Nicobar iflands, but is extremely rare; it refembles the laft, but is more convex and unequal-fided; except in the hinge, it is very like a tellina.

Striatula. The fhell is fmooth and diaphanous; the beaks are fubftriate, with a fmooth marginal impreffion before them, furrounded with a rim. It inhabits the Coromandel coafts, and is found alfo in the Mediterranean, is about two inches and a half long, and three inches broad; it is white, fub-triangular, rather convex, a little gaping on the fore-margin.

Striata. The fhell is thick and triangular, with ftrong, thick, crowded, fmooth, arched ftriæ; it is white, and glabrous within at the beaks. Is found in the Mediterranean, and is about the fize of the laft.

Glabrata. This fpecies has a fmooth, diaphanous, and ftriate fhell; the beaks are very fmooth; and the margins on each fide are ftriate. It is found in the African and Indian oceans; is about the fize of the *Striata;* the colour is white; beaks fmooth, and ftriate on the border.

Rotundata. Shell obtufely triangular, whitifh, with milk-white bands on the beaks; the margins, on each fide the beaks, are violet. It inhabits the Mediterranean, and is of the fame fize as the laft.

Nitida. The fhell is fnowy and diaphanous; the depreffions on each fide the beaks are ftriate; the anterior ones marked with a ridge. The fhell is triangular, and the beaks retroverted and diftant.

Corallina. This is an inhabitant of the Mediterranean and Guinea feas; the fhell is fmooth, fub-diaphanous, and white with paler bands; it is about two inches broad, and an inch and a half long, triangular, with obtufe depreffions on each fide the beaks.

Lactea. The fhell is thin, pellucid, white, and the fore-part very finely ftriate, with paler bands. It is found in the Indian ocean: it refembles the laft, but is thinner, and more convex; the anterior part is flattifh, with an obtufe margin.

* Stultorum. The fhell is femi-tranfparent, fmooth, and gloffy; it is obfoletely radiate, white without; and purplifh within. This is found on the fhores of our own country, and alfo in the American feas; and is only the fize of a hazel-nut; the fhell is convex, fomewhat triangular, brown, teftaceous or cinereous, with or without faint rays.

Grandis. Shell femi-tranfparent, fmooth, fawn-colour, with pale rays; the beak and hinge placed beyond the middle. This is very like the laft; is more than three inches broad; and two broad, gaping at the extreme angle; the anterior fide more produced.

* Solida. Shell opaque, and fmoothifh; found very commonly on the European fhores; the fhell is thick, ftrong; colour white, to a yellowifh-brown, frequently marked with blue or pale orange belts; while alive it is fmooth, and when dead it has a few high tranfverfe ftriæ, like ribs; the lateral teeth are fmall, elongated with a large hollow; the middle tooth is fmall.

* Lutraria. The fhell is oval-oblong and fmooth, without lateral teeth. It inhabits the European coafts, near the mouths of rivers; it refembles a mya gaping at both ends; in colour it is of a dirty-white, or yellowifh tinged with orange, and irregularly clouded with brown; hinge with a fmall and large triangular cavity in one valve, and a fimilar cavity with an elevated triangular tooth in the other.

Cygnus. Shell fnowy, thick, and three-fided, very finely ftriate tranfverfely; the fore-part is flattifh, and flightly wrinkled; behind the beaks a broad, heart-fhaped, thinly ftriate impreffion. It is found on the coafts of Tranquebar; an inch long, and rather more than an inch broad.

Maculata. Shell obtufely triangular, fmooth, thin, with pellucid chefnut fpots; within white, and very finely ftriate.

Turgida. The fhell of this fpecies is inflated, faintly ftriate, of an ochre colour, but white within; the beaks are diftant purplifh; the hinge has a fupernumerary triangular double tooth. It inhabits Tranquebar, and is nearly three inches long, and more than that broad; it is thin, pellucid, finely ftriate, and wrinkled before and behind.

Violacea. Shell thin, obfoletely radiate, finely ftriate tranfverfely; margins on each fide the beaks whitifh; hinge with a fupernumerary double triangular tooth. This is found on the coafts of Tranquebar, and is about two inches long, and three broad. The fhell is thin brittle, gaping here and there, the anterior margin oblong, elevated, and wrinkled.

Cuneata. Shell wedge-fhaped, blue, finely ftriate tranfverfely; the margin crenulate within; it refembles in many refpects the laft, but is only an inch long, and not fo much as that broad; it is fometimes white.

Glauca. The fhell of this is ovate, dirty-white, with glaucous rays, very finely ftriate tranfverfely; the anterior part wrinkled. It inhabits the Mediterranean; the fame fize as the Turgida: the beaks are turned backwards, with a narrow gape between them.

Pellucida. Shell ovate, thin, and of a pellucid white, with unequal tranfverfe ftriæ. It inhabits Guinea; is not two inches long, but rather more than this broad; the fhell is brittle, a little produced forwards, and gaping.

Fragilis. In this the fhell is ovate, thin, fmooth, pellucid, flattifh; the anterior gape tranfverfely ftriate, and wrinkled. It inhabits the Nicobar iflands, and refembles the laft; the fhell is gaping, and flightly plaited on the fore-

fore-part; the margin is acute, subangular before and rounded behind.

Rugosa. Shell ovate, dirty-white, with elevated longitudinal striæ crossing the transverse ones, which are a little more raised. It is thick and white within, and is about two and a half inches long, and the same in breadth.

Nicobarica. Shell ovate, thin, and pellucid on the fore-part; the hind-part with cancellate striæ. Found in and about the Nicobar islands.

Complanata. In this the shell is ovate, thin, with arched plaits; the plaits transversely striate. It inhabits India, and is of a blueish colour, but sometimes white, is an inch long, and two and a half broad.

* Listeri. Shell very thin, nearly round, whitish; hinge with a triangular tooth, and large pyriform hollow. Found at the mouth of the river Tees; rather larger than the last.

Piperita. Shell ovate, compressed, transversely striate; teeth of the hinge very minute, with a large oblique hollow. Inhabits the Mediterranean; about two inches long and one and a half broad.

MACUCAGUA, in *Ornithology*, the name of a Brasilian bird of the gallinaceous kind, called also by some the *gallina sylvestris*, or wild hen. It has no tail: but is a very well tasted fowl, and has twice as much flesh as the European hen; its eggs are somewhat larger than the common hen eggs, and of a blueish-green colour; it feeds on fruit that falls off the trees, &c. and runs well, but cannot fly high or far, and never is seen in the trees. Marcgrave. See Tetrao *Major*.

MACUIH-YU, in *Geography*, a small Chinese island, belonging to the province of Quang-tong. N. lat. 23° 10′. E. long. 116° 32′.

MACUL, a town of Chili; 15 miles S.E. of St. Yago de la Nouvelle Estramadura.

MACULA, a sea-port of Arabia, in the province of Hadramaut; 150 miles N.E. of Aden.

Macula, in *Medicine*, a *spot*, is a term principally used to denote those detached efflorescences of the skin, or discoloured patches, of various dimensions and figures, which appear without any considerable elevation or protuberance above the rest of the surface, and with large interstices of the natural colour. The term includes, therefore, those congenital discolourations, which are called *mother-spots*, or technically *nævi materni*, and which are commonly attributed, without any foundation, to frights or other affections of the mind or imagination of the mother; as well as *moles*, *petechiæ*, *freckles*, &c. See Imagination.

The *maculæ hepaticæ*, or *liver-spots* of the older authors on medicine, are little else than large freckles; consisting of patches of various sizes, affecting chiefly the breast, shoulders, and groins, of a brown colour, and accompanied with a slight roughness of the surface, in consequence of the formation of minute branny scales, in which the cuticle partially exfoliates. In the arrangement of cutaneous affections adopted by Dr. Willan, these spots are comprehended in the order of *scaly* diseases, under the title of Pityriasis; which see.

The *maculæ volaticæ* of authors, which occur in infants during dentition, are varieties of the eruption, popularly denominated the *red-gum*, the Strophulus of Dr. Willan. See that article; also Dentition, and Infants, *Diseases of.*

The last mentioned author has constituted an order of *maculæ* in his arrangement, which includes those chronic affections of the skin, that are unaccompanied by scales, pimples, rashes, vesicles, pustules, or tubercles, which characterise the other orders. It comprehends principally, therefore, the *ephelides* and freckles, *nævi*, moles, and other original marks. The removal of these spots is sometimes accomplished by surgical means; but they are merely local, and beyond the controul of medicine. See Nævus, &c.

Macula *Oculi*, a word used by many authors to signify a cataract or suffusion.

Maculæ, in *Astronomy*, dark spots appearing on the luminary faces of the sun, moon, and even some of the planets.

In which sense *maculæ* stand contradistinguished from *faculæ*.

The *solar maculæ* are dark spots of an irregular, changeable figure, observed in the face of the sun, first taken notice of by Galileo, 1610, soon after he had finished his telescope, and afterwards accurately observed by Scheiner, Hevelius, Mr. Flamsteed, Cassini, Kirch, &c. Phil. Trans. vol. i. p. 274. vol. lxiv. p. i. p. 194.

Many of these maculæ appear to consist of heterogeneous parts; of which the darker and more dense are called by Hevelius nuclei, and are encompassed, as it were, with atmospheres somewhat rarer, and less obscure; but the figure both of the nuclei and entire maculæ is variable. In 1644, Hevelius observed a small thin macula, which, in two days time, grew to ten times its bulk; appearing withal much darker and with a larger nucleus, and such sudden mutations are frequent. The nucleus, he observed, began to fail sensibly before the spot disappeared; and that, before it quite vanished, it broke into four, which, in two days, again re-united. Some maculæ have lasted two, three, ten, fifteen, twenty, thirty, but seldom forty days; though Kirchius observed one in 1681, which remained from April 26th to the 17th of July. The spots move over the sun's disk with a motion somewhat slacker near the limb than the centre: that observed by Kirchius was twelve days visible on the sun's disk; for fifteen days more it lay behind it, it being the usual rule to return to the limb whence they departed in twenty-seven, sometimes in twenty-eight days.

Lastly, it must be observed, that the maculæ contract themselves nearer the limb, and in the middle of the disk appear much larger; those often running into one in the disk, which in the limb were separate: that many of them arise in the middle of the disk, and many disappear in the same: and that none of them are observed to deviate from their path near the horizon; whereas Hevelius, observing Mercury in the sun near the horizon, found him too low, being thrust twenty-seven seconds beneath his former path.

From these phenomena we collect, 1. That since Mercury's depression below his path arises from his parallax, the maculæ, having no parallax from the sun, are nearer him than that planet.

2. That, since they arise and disappear in the middle of the sun's disk, and undergo various alterations with regard both to bulk, figure, and density, they must be formed *de novo*, and again dissolved about the sun; and hence some have inferred, that they are a kind of solar clouds, formed out of its exhalations.

3. If they are of this nature, as they rise over his body and are suspended at a certain height from it, it appears, from the laws of hydrostatics, that the sun must be encompassed with some fluid to drive those exhalations upwards; which fluid must be denser as it is lower, and rarer as higher, like our atmosphere: and, since the maculæ dissolve and disappear in the very middle of the sun's disk, the matter thereof, supposing them to be solar exhalations, must fall back again to the sun: whence there must arise changes in the sun's atmosphere; and consequently in the sun itself.

4. Since

4. Since the revolution of the maculæ round the sun is very regular, and since their distance from the sun is very small, it is not properly the maculæ that move round the sun, but it is himself, together with his atmosphere, wherein the maculæ swim, that in the space of twenty-seven days, twelve hours, twenty minutes, moves round his own axis; and to the same fixed star in twenty-five days, fifteen hours, fixteen minutes (see SUN); and hence it is, that the maculæ, being viewed obliquely near the limb, appear narrow and oblong.

5. Since the sun appears with a circular disk in every situation, his figure, as to sense, must be spherical.

The magnitude of the surface of the spot may be estimated by the time of its transit over a hair in a fixed telescope. Galileo reckons some spots to be larger than all Asia and Africa put together: but if he had known the sun's parallax and distance as exactly as we do, he would have found them much larger than the whole surface of the earth. For, in 1612, he observed a spot so large as to be plainly visible to the naked eye; it, therefore, subtended an angle at the eye of about a minute. The diameter of the earth, if removed to the sun, would subtend an angle of but about seventeen seconds. Therefore, the diameter of the spot was to the diameter of the earth as sixty to seventeen, or three one half to one, nearly; and consequently, the surface of the spot, if circular, to a great circle of the earth as twelve one-fourth to one, and to the whole surface of the earth as twelve one-fourth to four, or nearly three to one. Gassendus observed a spot whose diameter was $\frac{1}{20}$th of the sun's, and, therefore, subtended an angle at the eye of above a minute and a half. Its surface was, therefore, above six times larger than the whole surface of the earth. He tells us, that he saw above forty spots at once, but did not perceive that the light of the sun was sensibly diminished: nevertheless, the paleness of the sun mentioned by historians, after the death of Julius Cæsar, might have been caused in this manner, if we admit the fact.

The opinions that have been formed concerning the nature, origin, and situation of the solar spots, have been various: Dr. Wilson, professor of practical astronomy in the university of Glasgow, by attending particularly to the different phases presented by the umbra, or shady zone, of a spot of an extraordinary size that appeared upon the sun, in the month of November, 1769, during its progress over the solar disk, was led to form a new and singular conjecture concerning the nature of these appearances; which he seems to have afterwards confirmed by repeated observations. The results of these observations are, that the solar maculæ are cavities in the body of the sun; that the nucleus, as the middle or dark part has been usually called, is the bottom of the excavation; and that the umbra, or shady zone usually surrounding it, is the shelving sides of the cavity. Dr. Wilson appears not only to have very satisfactorily ascertained the reality of these immense excavations in the sun's body, but has pointed out a method of measuring the depth of them. He estimates, in particular, that the nucleus, or bottom of the large spot above mentioned, was not less than a semidiameter of the earth, or about four thousand miles, below the level of the sun's surface; while its other dimensions were of a much larger extent. He observed, that when a spot in the middle of the sun's disk, where it is surrounded equally on all sides with its umbra, comes near the western limb of the sun; that part of the umbra, which is next to the sun's centre, gradually diminishes in breadth, and at length, when the spot reaches within about a minute of the limb, totally disappears; while the umbra, on the other side of it, continues nearly of its former dimensions. If, after the period of half a revolution, the spot appears again on the opposite side of the disk, that part of the umbra, which had before disappeared, and which is now on the left hand side of the nucleus, is now plainly to be seen: but the umbra on the other side of the spot, or that which is next to the sun's centre, seems to have vanished in its turn; being hid from the view by the upper edge of the excavation, or by the oblique position of its sloping sides, with respect to the eye. As the spot, however, advances on the sun's surface, this umbra, or side of the cavity, comes in sight; it first appearing narrow, but afterwards gradually increasing in breadth, in proportion as the spot moves toward the middle of the disk. These appearances, in particular the gradual diminution and disappearance, as well as the re-appearance and gradual enlargement of the umbra, on the one side or the other of a spot, according as it advances near the western limb, or proceeds onwards from the eastern edge of the sun, are naturally accounted for by Dr. Wilson's supposition, that the umbræ are the sloping sides of a cavity, which will appear under different angles, or of different breadths, or totally disappear, according to their position with respect to the eye of the spectator. These appearances, at least, perfectly resemble the phases that would be exhibited by an excavation in a spherical body, made to revolve on its axis; the bottom of the cavity being painted black, and the sides lightly shaded. From these and other observations it may be inferred, that the body of the sun, at the depth of the nucleus, either emits no light, or emits so little as to appear dark, when seen at the same time, and compared with that resplendent, and probably, in some degree, fluid substance that covers his surface. This manner of considering these phenomena naturally gives rise to many curious speculations and inquiries. It is natural, for instance, to inquire by what great commotion this refulgent matter is thrown up on all sides, so as to expose to our view the darker part of the sun's body, which was before covered by it? What is the nature of the shining matter? and why, when an excavation is formed in it, is the lustre of this shining substance, which forms the shelving sides of the cavity, so far diminished as to give the whole the appearance of the shady zone, or darkish atmosphere surrounding the denuded part of the sun's body? On these and many other subjects, Dr. Wilson has advanced some ingenious conjectures; for which we must refer the curious to the Phil. Trans. vol. lxiv. part i. art. 1. See also some remarks on Dr. Wilson's Theory, by Mr. Woolaston, in the Phil. Trans. vol. lxiv. part ii. art. 1. p. 337, &c.

M. de la Lande, in the Memoirs of the French Academy for 1776, contends, that the spots of the sun are owing to dark bodies like rocks, which by an alternate flux and reflux of the liquid igneous matter of the sun, sometimes raise their heads above the general surface: and that that part of the opaque rock, which at any time thus stands above, gives the appearance of the nucleus, while those parts which in each lie only a little under the igenous matter, appear to us as the surrounding umbra. See this opinion examined, and Dr. Wilson's vindicated by himself, in Phil. Trans. vol. lxxii. pt. i. art. 10.

Dr. Herschel thinks that the sun is an opaque body, possibly inhabited, covered with an atmosphere in which clouds of a luminous nature are floating, and that the spots are interruptions of these clouds. Of these clouds, as he conceives, there are two strata, the upper of which only is luminous, and the lower stratum, as he supposes, protects the body of the sun from their heat. Phil. Trans. for 1795, vol. lxxxv. p. 46, &c.; and in Phil. Trans. for 1801, p. 265. 354, he endeavoured to shew that the variations of heat of different years is owing to the more or lefs copious fupply of fuel in the fun, which conftitutes his fpots. See FACULÆ, SPOTS, and SUN.

MACULPA, in *Geography*, a town of Mocaumpour; 20 miles S. of Batgan.

MACUMBA, a country of Africa, forming the fouthern province of Mocaranga.

MACUNA, in *Botany*. See DOLICHOS.

MACUNA, in *Geography*, one of the Navigator's iflands, in the South Pacific ocean, where feveral of M. de la Peroufe's crew were maffacred by the inhabitants. S. lat. 14° 19'. W. long. 169°.

MACUNGY, a townfhip of America, in Northampton county, Pennfylvania, containing 1844 inhabitants.

MACUPA, a town of Africa, in the country of Mambaça, near the coaft; five miles N.W. of Mambaça.

MACURITAS, a town of the ifland of Cuba; 115 miles W.S.W. of Havanna.

MACUTA, in *Commerce*, a money of account in Guinea, on the coaft of Africa, equal in value to 2000 fmall fhells, called cowries, or zimbis. The Sierra Leone Company ufe pieces of 10, 5, 2, and 1 macutas. The firft weighs 16 dwt. 21 gr. contains, in pure filver, 330.8 gr. and is worth 3*s.* 10¾*d.* fterling. The fecond weighs 8 dwt. 13 gr. contains, in pure filver, 167.6 gr. and its value is 1*s.* 1¼*d.* fterling. The third weighs 3 dwt. 7½ gr. contains, in pure filver, 65 gr. and is worth 9*d.* The fourth weighs 1 dwt. 16 gr. contains, in pure filver, 32.5 gr. and its value is 4½*d.* fterling. The 10 macuta piece, or dollar, has on one fide two joined hands, with the figures 100 both above and under them, and the infcription "one-dollar piece;" on the reverfe, a lion; legend over the lion, SIERRA LEONA COMPANY, and under it, AFRICA. The half-dollar is marked 50; the ⅕ dollar, 20; and the 1/10 dollar, 10; with the infcriptions, HALF-DOLLAR PIECE, TWENTY-CENT PIECE, and TEN-CENT PIECE: the reft as on the dollar.

MAD, in *Geography*, a town of Hungary; five miles N. of Tokay.

MAD, a river of America, called alfo "Pickawa Fork," which is a rapid branch of the Great Miami, that paffes in a beautiful ftream with a S.W. courfe through a pleafant level country of very great fertility.

MAD-*Apple*, or *Melongena*, in *Botany*. See SOLANUM.

This plant is propagated in the gardens of the curious with us; and in Spain, Italy, and Barbary, common in the kitchen-gardens, the fruit of them being frequently eaten there, boiled with fat flefh, putting thereto fome fcraped cheefe, and preferving it through the winter with vinegar, honey, or falt pickle. This they efteem of great efficacy to provoke venery. In fummer alfo, when the fruit is juft ripe, they eat it frefh dreffed, with fpices, and other ingredients.

The apples being much like thofe of the mandrake, have induced fome moderns to fufpect this plant to be the male mandrake of Theophraftus; and fuppofing them to be deadly to call them mad-apples; whereas in reality they excite no fymptoms of madnefs, but are ufed by the Italians and Spaniards in their fauces and fweatmeats. They have the tafte of the citron.

MAD-*Dog*. See DOG and HYDROPHOBIA.

MAD-*Water*, among *Miners*, is water that has been drawn from a fhaft, or any part of the mine, and returns back again to the fame place from whence it was drawn.

MAD-*Wort*, in *Botany*. See ALYSSUM.

MAD-*Wort*, *German*. See ASPERUGO.

MADABLOTA. See GÆRTNERA.

MADAGASCAR, in *Geography*, an ifland in the Indian fea, feparated from the coaft of Africa by the channel of Mozambique. Its length is ftated by De Pagés to be about 900 miles and its breadth 100; but others affign to it 840 geographical miles in length, and about 220 in medial breadth. De Pagés fays, that next to Borneo, it is the moft extenfive in the world. He might alfo have excepted Papua and New Holland, if the latter may be claffed in the number of iflands. As it extends from N.N.E. to S.S.E. from the 12th to the 26th degree of fouth latitude, its climate is mild and agreeable. Of its firft difcovery, nothing certain is known. The ancients, even as late as Ptolemy, feem to have been unacquainted with it. The firft mention of it, upon which we can depend, is by Marco Polo, in the 13th century, who having derived his knowledge of it from the Arabs, defcribes it by its prefent name. It efcaped the notice of Gama, who coafted along the African fhore; and though it is faid to have been known to the Arabs and Perfians from time immemorial, under the name of "Sarandib," its firft difcovery is afcribed to Lorenzo, or Lawrence Almeyda, in the year 1506. Hence the Portuguefe gave it the name of St. Lawrence; the French, in the reign of Henry IV., called it Ifle Dauphiné: its real name, however, is Madecaffa, though it is now generally known by that of Madagafcar. It is divided into 28 provinces; and its furface, according to Rochon, may be eftimated at 200 millions of acres of good and arable ground, celebrated for fertility and for the variety of its productions. All its different parts are watered by torrents and large rivers, and more efpecially by a number of fmaller rivulets, which flow from the vaft ridge of mountains that feparates the eaftern from the weftern coaft. Vigagora is the higheft mountain in the N., and Botiftmena in the S. Thefe mountains contain in their bowels precious minerals and curious foffils, and their fummits are crowned with lofty trees, of long duration. The fcenery which the ifland prefents is very picturefque and interefting, as it is diverfified with precipices, cataracts, and immenfe forefts. The vegetation of its hills and plains experiences no obftruction from the viciffitude of the feafons, nor does it derive much affiftance from the labour of the inhabitants. The fpacious commons afford pafture to numerous droves of oxen and flocks of fheep: and the foil evinces its fertility, with little aid of culture, by yielding a crop of rice in the proportion of 100 grains to one that is fown. The woods afford a prodigious variety of trees, fuch as all kinds of palm trees, woods ufed in dyeing, ebony, bamboos of an enormous thicknefs, as well as orange and lemon trees. They alfo fupply timber for building fhips and houfes. Flacourt fays, that in the year 1650 he fent to France 52,000 aloe trees of the firft quality; and he has given the names of two or three hundred different plants. Of late there have been obtained from this ifland the Mauritanian mulberry with green fruit, and the Gummiphera Madagafcarienfis, the juice of which, called by the iflanders "finguiera," concretes into an elaftic gum, fimilar to the caoutchouc of Cayenne. Of efculent plants this ifland furnifhes not only rice in abundance, but the banana, yam, nymphæa lotos, feveral fruits of dolichos or kidney beans, gourds, water melons, and cocoa nuts. The fruits are pine apples, tamarinds, oranges, and pomegranates. The fpices and other condiments are common and betel pepper, ginger, turmeric, cinnamon, and fugar. The Indian fig grows, as well as cotton and indigo. Many quadrupeds are peculiar to this ifland, whence fome naturalifts have, perhaps, too haftily inferred, that it never joined the African continent. Here are no lions, tigers, elephants, nor horfes. Many of the moft valuable minerals might be fupplied from hence; fuch as the pureft rock cryftal, beds of which occur, gold ore, topazes, fapphires, emeralds, and

 fpotted

ſpotted jaſper, or blond ſtones. Here are found numerous black tourmalins of Haüy, which the ancient mineralogiſts conſidered as the ſchorl of Madagaſcar. The inhabitants of Madagaſcar, who call themſelves "Malegaſhes," or "Madecaſſes," are in general well-ſhaped, and above the middling ſize: the colour of their ſkin is various; ſome tribes being of a deep black, others tawny; ſome having a copper complexion, but the greateſt number being of an olive colour. All thoſe that are black have woolly hair, like the negroes of the coaſt of Africa. The hair of thoſe who have the complexion of Indians or Mulattoes, does not frizzle more than that of the Europeans; their noſe is not flat; their forehead is broad and open, their lips not pouting, and every feature of their face is regular and pleaſant. Their phyſiognomy bears, in general, the marks of a character replete with frankneſs and amenity. Rochon compares them, with regard to their diſpoſition and général character, to the ſavage, whoſe condition he abſurdly extols, becauſe, like the brute animal, he is deſtitute of all reflection on the paſt, and forethought with regard to the future. From the hair, complexion, and make of the natives of Madagaſcar, M. de Pagés conceived them to be deſcended from different races of men. Some who are ſhort, with lank and ſmooth hair, of an olive complexion, have a ſtrong reſemblance to the Malay Indians, and do not ſeem to have originally ſprung from the aborigines of the iſland. Others, tall and well-proportioned, with criſped locks, large and beautiful eyes, an eaſy carriage, and an open, unreſerved countenance, appear to be the true poſterity of the primitive inhabitants; their colour is nearly black, and differs but little from that of the natives on the Malabar coaſt. In their diſpoſition they are lively and obliging, but wholly deſtitute of genius; vain, whimſical, and intereſted; dextrous in the uſe and application of their bodily faculties; but without the powers of combination, and in the general conduct of life, light, precipitate, and incapable of preſerving a ſteady conduct, or of acquiring a decided character. With weak minds, they poſſeſs a conſiderable portion of wit and vivacity, and they blend a variety of good and bad qualities. They wear an apron at the girdle, and ſomething of the ſame kind on the ſhoulders, with a bonnet conſtructed like an umbrella; the hair is combed into ſmall treſſes, and the beard is permitted to grow only on the chin. The men are little addicted to agriculture, but more inclined to look after their cattle, which roam in the woods. They conſtruct war canoes, as well as canoes for their ordinary occupations. The latter are ſmall, and navigated only with the oar; but the former, which are the property of the chief, are much larger, and have a ſort of rigging. Some of them carry 100 men, and are in condition to ſail round the iſland. The women are generally of the middle ſize, with expreſſive faces, and though not entitled to be claſſed with the handſome part of the ſex, few of them are ugly. Round the waiſt they have a long apron, with a kind of under waiſtcoat, which barely covers the breaſts. They frequently wear, by way of ornament, a large circular plate of ſilver; and round the neck, falling down upon the boſom, a number of ſmall ſilver chains. Their hair appears in a multitude of little treſſes, dangling over the forehead, or on the corner of the eye, or turned up in the form of a creſcent. The women, beſides cultivating fields of corn, rice, and other ſorts of grain, are employed in planting trees and roots, particularly the caſſava, batatas, and the banana or plantain. The leaves of the tree, named raſia, are made to ſupply them with thread; and with theſe materials, dyed of various colours, they manufacture a kind of cloth, which is woolly, and affords a very handſome article of dreſs. They prefer, however, the cotton ſtuffs imported by Europeans from the continent. Every family is provided with a loom, and carries on a manufacture equal to its own conſumption. From the leaves of a tree, named vacoua, they procure materials for mats, bonnets, bags, and other uſeful articles. Their common food conſiſts of rice, bananas, and dried fiſh; they conſume little fleſh meat or freſh fiſh; their drink is water, or the juice of the ſugar cane, fermented with pimento and muſtard. Their houſes are ſmall and awkwardly conſtructed. The walls are formed of bull-ruſhes, and the roof covered with plantain leaves. The chief part of the timber work conſiſts of maſſy pieces of wood, the reſt being bamboo, very rudely executed. The floor is laid with the pith of the palm, or ſome other tree, and is often raiſed far above the level of the ground, to avoid the exhalations of the ſoil, and alſo to guard them from the annoyance of ſerpents and inſects during the rainy months. Although the natives have no regular form of worſhip, they nevertheleſs adore one ſupreme being, as the patron of juſtice and goodneſs, who will judge men after death, and reward or puniſh them according to the merit or demerit of their actions. The rite of circumciſion is performed upon males between the 7th and 8th year of their age; and the day of circumciſion is obſerved with feſtivity, and cloſed with the ſingular cuſtom of firing from a muſket the fore-ſkin of the patient. They believe alſo in a devil, or evil being; and upon this article is founded the craft of the Panſaret or Magician, who, being ſuppoſed to defeat or controul the machinations of the inviſible enemy, practiſes a thouſand tricks on the credulity of the multitude. Amulets of a ſpecies of wood, ſuſpended round the neck, or preſerved in a little bag, are ſuppoſed to ſecure the poſſeſſor againſt wounds and the diſaſters of war. A ſhrimp or toad, applied with words of incantation to the head of a perſon affected by diſeaſe, is expected to reſtore him to health. Expoſing the ſick in a hut of a certain elevation, open towards the eaſt, from which is let fly an aſſemblage of party-coloured threads, is a ſovereign remedy in the moſt deſperate caſes. Perfumes are introduced in abundance in all the arts and enchantments of the magicians. All theſe abſurd obſervances ſeem to be the barbarous veſtiges of religious notions, indiſtinctly tranſmitted to the people from their Aſiatic neighbours. The rite of circumciſion, the common uſe of perfumes, and a profound veneration for the quarter of the eaſt, are evidently the remains of religious ſyſtems of the higheſt antiquity. But the moſt horrid part of their ſuperſtition remains ſtill to be related. When an infant has the misfortune to drop into the world on a day eſteemed unlucky, or of bad omen, by the Panſaret, he is expoſed or ſuffered to die of want, or to be devoured by wild beaſts. The natives are accuſtomed to hunt the whale along their coaſt; and when he is ſtruck with the harpoon, they wait till his ſtrength is nearly exhauſted, and then lead him towards the ſhore. The women aſſemble on the beach, and vociferate ſongs of praiſe in honour of him who gave the firſt wound. The whale is then near the land, and ſurrounded by all the men in the village, when the public orator advances, and having pronounced a long oration on the pre-eminent qualities of the fiſh, the whale is cut up, and affords a rich repaſt to the company. When any ſubject of diſpute occurs between the natives of Madagaſcar and the Europeans, or between Indians of different tribes, it is formally diſcuſſed in the "palaver," or council of the tribe; and the deciſion is the reſult of long deliberation.

Property in this iſland conſiſts of cattle, grain, and ſlaves of the ſame nation with their maſter. Every perſon who has the misfortune to be made a priſoner of war, man, woman, or or child, is reduced to the condition of ſlavery, and from that moment is regarded by his own kindred as an object of contempt. Their arms conſiſt of a ſhield, and the "ſagay," a kind of lance, which they throw with peculiar addreſs. They are alſo tolerably well provided with muſquets, purchaſed from the French; and they have alſo ſome ſwivel guns and cannon, obtained from the ſame quarter. The reſidence of the chief is within a fort or ſtockade, conſiſting of three rows of large trees, fixed in the ground ſo cloſe as almoſt to exclude the light; and faſtened together at the top by a croſs beam. Their forts in general are mere ſimple paliſades, conſtructed in the form of an oblong ſquare; though ſome of them have baſtions and galleries, with openings for the purpoſe of reconnoitring. On the eve of war, the women, children, and cattle, retreat to the woods, and there conceal themſelves, waiting the iſſue of the campaign. The village is then occupied only by the men, who, previouſly to any act of hoſtility, ſacrifice an ox. An Indian, of diſtinguiſhed eloquence, harangues on the injuſtice of the enemy; and his countrymen, in the mean while, dip their ſagays in the blood of the victim. Their operations in the field are of a very deſultory deſcription, conſiſting chiefly in teazing and haraſſing the enemy, or attempting to ſurpriſe him in the night. They ſeldom come to a regular engagement. The natives of Madagaſcar are ſuſceptible of very violent enmities, and ſometimes execute on their devoted objects the moſt deliberate cruelties. The cuſtomary uſe of preſents is the ſame here as in India. It is the buſineſs of the inferior to make the firſt advance, as well as the firſt preſent; but he always receives another in return. The natives indulge in all the offices of hoſpitality; but not to the exceſs which ſome travellers have aſcribed to them, who have ſaid that it is cuſtomary for parents to proſtitute their children to the embraces of ſtrangers. This M. de Pages abſolutely denies. He acknowledges, however, that chaſtity in the intercourſe of the ſexes is little regarded. The young ladies of Madagaſcar, habituated to intrigue, prompted by the political and pecuniary views of their parents, and captivated by the charm of ſome new ornament for their perſons, ceaſe to be reluctant to the wiſhes of their admirers. Married women are very little addicted to violate the nuptial engagement. When a woman happens to conceive by a foreigner, ſhe recurs to various drugs, known to the natives, in order to procure abortion. In the language of Madagaſcar, which is by no means harſh or diſagreeable to the ear, M. de Pages perceived ſome inflexions of voice which occur in that of the Philippine iſles. It ſeems to be a compound of different languages, and contains many words borrowed from the Arabic and Portugueſe.

The iſland of Madagaſcar is divided into a great number of tribes. Its population, ſays M. Rochon, may be reckoned at 4,000,000 inhabitants; but no preciſe calculation is poſſible; as the iſland is divided into diſtinct ſocieties, each of which inhabits the canton which it likes beſt, and is governed by its own uſages. A tribe conſiſts of ſeveral villages, who all have a particular chief. This chief is ſometimes elective, but more frequently hereditary. The land is never parcelled out, but belongs to thoſe who take the trouble of cultivating it. Theſe iſlanders have neither locks nor bolts, and live in a frugal manner. The French ſettlement of Fort Dauphin is in the ſouth-eaſt extremity of the iſland. For an account of it, ſee *Fort* DAUPHIN. The chiefs never go out without their gun, and a ſtick tipped with iron, ornamented at its end with a tuft of cow-hair. They wear a cap of red wool, by the colour of which they are diſtinguiſhed from their ſubjects. In the province of Carcanoſſy, in which Fort Dauphin is ſituated, the territories are deemed to belong to the chiefs, who diſtribute them among their ſubjects for cultivation, for which they expect a ſmall return. The people of this province are not quite ignorant of the art of writing. They have ſome hiſtorical books written in the Malegaſh language; but their men of letters, called "Ombiaſſes," uſe the Arabic character. They have treatiſes on phyſic, geomancy, and judicial aſtrology. The moſt famous of them come from Mantatara, and profeſs geomancy and aſtrology in the public ſchools. The art of writing has doubtleſs been brought to this iſland by the Arabs, who conquered it between three and four centuries ago. The paper is manufactured in the valley of Amboul, and is wrought from the papyrus nilotica. The pens uſed by the iſlanders are made of bamboo. Their ink is prepared of a decoction in boiling water of the bark of a tree, called "Arandrato." The Arabic has made ſome progreſs in the north-weſt of Madagaſcar; and the Arabians have a ſtaple on the river Bombetoque in the iſland, where they carry on commerce; and thus they have ſucceeded in introducing, with their language and learning among the natives, ſome traces of Mahometaniſm. The contiguity of Madagaſcar to the coaſt of Africa makes it natural to aſcribe its population to that vaſt continent; and the different races of inhabitants are now ſo much confounded, as to render it a vain attempt to enumerate them. For an account of the *Kimoſſes* of Madagaſcar, ſee that article. The north-eaſtern part of the iſland of Madagaſcar is the rich ſtaple of the colonies of the iſles of France and Bourbon. The moſt frequented harbours are "Foule Pointe," "St. Mary's," and the "bay of Antongil." In theſe three places the French have endeavoured to form colonies; but the incurſions of pirates and the prevalence of the ſlave-trade have, according to Rochon's ſtatement, by their conſequences deſolated the northern part of Madagaſcar. S. lat. 12° 30′ to 25° 30′. E. long. 44° to 51°. Rochon's Voyage to Madagaſcar. De Pages' Travels round the World, vol. iii. See BENYOWSKY.

MADAGH, a town of Algiers, near the coaſt; 20 miles W.S.W. of Oran.

MADAH, a town of Perſia, in the province of Segeſtan; 24 miles S. of Zareng.

MADALENA, or MAGDALENA, a majeſtic navigable river of South America, in New Grenada, reckoned the Danube of this province, which riſes about 30 miles E. of Popayan, and after a northerly courſe of 100 miles, in which it is augmented by other rivers, runs into the Caribbean ſea. The courſes of this river, and alſo of the Cauca, are conſiderable ſtreams, perhaps the iſſues of ſubterranean waters, from the vaſt cavity under the Table land, where the volcanoes often pour out deſtructive torrents of water and mud. N. lat. 11°. W. long. 74 40′.—Alſo, a ſmall iſland in the Pacific ocean, near the ſouth coaſt of Chiloe. S. lat. 44° 15′.

MADALENA, *La*, a town of Canada, on the river St. Lawrence. N. lat. 46° 25′. W. long. 72 25′.—Alſo, a ſmall iſland near the coaſt of Sardinia. N. lat. 41° 15′. E. long. 9 35′.

MADALENA, *La*, *Bay of*, a bay on the weſt coaſt of California. N. lat 24° 53′. E. long. 247° 56′.

MADALENA, *St.*, a town of New Navarre; 150 miles S.W. of Caſa Grande.

MADAMAT, in *Hindoo Mythology*, the ſon of Kriſhna and Rukmeni, and a name of Kama, the god of love; he having been incarnated in the perſon of Madamat, otherwiſe Madana, or Makadama. See KAMA.

MADAME ISLE, in *Geography*, forms the north-eaſt ſide of the gut of Canſo, as you enter from the ſouth-eaſt, and

and is oppoſite to the eaſtern extremity of Nova Scotia. The north point of the iſland lies 14 miles S. of St. Peter's harbour, in Cape Breton iſland; on which iſland the iſles de Madame are dependent.

MADAMPAR, a ſea-port town of the iſland of Ceylon, on the weſt coaſt, at the mouth of a river.

MADAMUT, a town of Egypt, on the eaſt ſide of the Nile; 20 miles S.S.W. of Kous.

MADAN, MARTIN, in *Biography*, an Engliſh divine of the eſtabliſhed church, was born about the year 1726, and was brought up to the profeſſion of the bar, which he quitted for the church, though without preferment. The chapel at the Lock-hoſpital was built chiefly by his exertions; and he officiated many years as the chaplain, without any emolument. He is chiefly known as an author by a work entitled, "Thelyphthora, or a Treatiſe on Female Ruin," in 3 vols., 8vo., publiſhed in 1781, which occaſioned a long and very violent controverſy. The author maintained the lawfulneſs, or even the duty of polygamy. Mr. Madan was a good claſſical ſcholar, and publiſhed a tranſlation of Juveral and Perſius: he alſo wrote a treatiſe on "Capital Puniſhments." He died in 1790, having attained to much popularity as a preacher; and as a man, his moral character was unimpeachable.

MADAN's *Point*, in *Geography*, a cape on the north-eaſt coaſt of the iſland of St. Chriſtopher. N. lat. 17° 28'. W. long. 62° 38'.

MADANA, in *Hindoo Mythology*, a name of Kama, the Hindoo god of love, otherwiſe *Madamat;* which ſee.

MADAPASSA, in *Geography*, a town of Bengal; 60 miles S. of Dacca.

MADAPOUR, a town of Bengal; 10 miles S.E. of Rajemal.

MADARAVAN, a town of Fez, in the vicinity of iron-mines, not far from mount Atlas.

MADARGUNGE, a town of Bengal; 82 miles N.N.W. of Dacca.

MADAROSIS, from μαδος, *bald*, in *Surgery*, a loſs of the eye-laſhes.

MADBAH, in *Geography*, a town of Kemaoun; 23 miles S.E. of Kerigur.

MADBAN, a town of Hindooſtan, in Bahar; 37 miles S.E. of Bettiah. N. lat. 26° 25'. E. long. 85° 21'.

MADBURY, a townſhip of America, in Strafford county, New Hampſhire, between Dover and Durham, about 10 miles N.W. of Portſmouth; incorporated in 1755, containing 544 inhabitants.

MADDAPOUR, a town of Bengal; 34 miles E. of Mauldah.

MADDEN, *Dr.* SAMUEL, in *Biography*, was born in Ireland about the year 1686, and educated at Dublin, where he reſided the greater part of his life. In 1729 he was in England, and wrote a tragedy, entitled "Themiſtocles;" and was, as he ſays of himſelf, tempted to let it come out, by the offer of a noble ſtudy of books from the profits of it. In 1732 he publiſhed "Memoirs of the twentieth Century," a work which, for ſome reaſon not now known, was in a few days totally ſuppreſſed. In 1740 we find him in his native country, and ſetting apart the ſum of one hundred pounds to be diſtributed in premiums for the encouragement of arts, manufactures and ſcience; and the ſame ſum he continued to beſtow annually for the like purpoſe, ſo long as he lived. The good effects of theſe well-directed benefactions were not only felt in Ireland, but their influence was extended to the ſiſter country, and, it is thought, gave riſe to the "Society for the Encouragement of Arts, Manufactures, &c. in London," of which his grace the duke of Norfolk is now the preſident. Dr. Madden obtained church preferment in Ireland, and he died in December 1765. He left behind him another tragedy, as a legacy to Mr. Sheridan. Biog. Dram.

MADDER, in *Agriculture*, the common name of a plant, ſometimes cultivated in the field, as an ingredient in the dyeing of a ſcarlet colour. The ſorts commonly cultivated for this uſe is, the *rubia tinctoria*, which is a plant of the thick fleſhy tap-rooted kind.

It is ſtated by a late writer, that this plant "was formerly much more cultivated in particular diſtricts in this country than it is at preſent, the importations from Holland having leſſened the demands, and reduced the price of it, ſo much as to render its culture incapable of being conducted with profit to the farmer."

Soil.—The ſoils which are the moſt ſuited to the cultivation of this plant, according to the ſame writer, are thoſe of the deep fertile ſandy loams that are not retentive of moiſture, and which have a conſiderable portion of vegetable matter in their compoſition. It may alſo be grown on the more light deſcriptions of ſoil that have ſufficient depth, and which are in a proper ſtate of fertility to admit of its being grown upon them.

Preparation, and Plants or Sets.—In the preparation of the land for the reception of this crop, "it will be neceſſary to plough it up deeply before the winter into high ridges, in order that it may be expoſed to the action and influence of the froſts, and the atmoſphere. Early in the ſpring theſe ridges ſhould be well harrowed down by a heavy long-tined harrow, and then ploughed again in the contrary direction to a good depth. And when after this the land is not perfectly clean from weeds, or not rendered ſufficiently fine and mellow, another ploughing and harrowing ſhould be given. In the laſt operations the ground ſhould always be left in as level and even a ſtate as poſſible. It is then ready for the reception of the plants. The ſets or plants may then be obtained either by ſowing the ſeed upon a bed of earth which is rich, and made perfectly fine by digging and raking in the ſpring, and then lightly covered in, or from offſets or ſuckers from the old plants. In the firſt method, on the plants appearing they ſhould be made perfectly clean by weeding, and be ſet out to the diſtance of three inches in the beds by the hoe. In this way, by keeping the ground quite clean and well ſtirred about the plants, they will be ready to ſet out in the ſecond autumn, though it will moſtly be better to defer the buſineſs till the ſpring, in this climate, if the ſets can be procured, as the plants ſeldom ripen their ſeed perfectly, or afford it in a ſtate to vegetate well. It requires about twenty thouſand plants for ſetting an acre of land. The moſt ſuitable time of taking the ſets is ſhewn by the plants having attained the height of ten or twelve inches from the ground, and the ſuckers having thrown out fibrous roots at their bottoms. This may be ſeen by drawing up a few of the plants, and uſually about the latter end of May or beginning of June." Beſides "it is neceſſary that the ſets have formed root-fibres at the bottoms, before they are removed, as where that is not the caſe, they never ſucceed well."

The land being prepared in the manner directed above, and the plants thus provided, "a ſufficient number of labourers are to be provided, that the work may be performed as expeditiouſly as poſſible. In taking off the ſets, much care is neceſſary not to injure them. Some perform it by means of a dibble with a flat edge, and which is ſhod with iron; this tool, on being thruſt into the ground on the ſide of the ſhoots, divides and ſeparates them by depreſſing the handle without hurting the fine fibrous roots. The number of plants

plants that can be fet in a fhort fpace of time fhould only be taken up at once. They fhould be prepared by having about a third of their top parts cut off. A fort of thin batter fhould likewife be made, by mixing good vegetable mould and water well together, into which the roots of the fets fhould be dipped before they are placed into the earth, as by this means the neceffity of watering the plants afterwards is prevented. This work is executed by a perfon before the planting commences. Two others are employed afterwards in diftributing the plants fo as to be convenient for putting them into the ground."

There are different methods employed in fetting the plants; in fome cafes they are put in the furrow by means of the plough, while in others they are fet in beds by a dibble. The former is probably the better method, and as being the moft expeditious, is beft adapted to the culture of the plant on an extenfive fcale. In this the planter begins by drawing a ftraight furrow on one fide of the plantation to a good depth; a row of plants is then laid in it by a perfon for the purpofe, at the diftance of five, fix, or more inches from each other, according to the circumftances of the land, in fuch a manner as to lean off from the plough; another furrow is then formed, by the mould of which they are covered. In this manner the work proceeds until the whole is finifhed.

In the other method, it is obferved, the fets, after the land has been formed into beds, five feet in breadth, with two feet between each for intervals, are put in by means of a line and a dibble, beginning at the diftance of fix inches from the outfides, and fetting a row of plants at fuitable diftances from each other, as juft mentioned; then removing the line two feet farther on them, and putting in another row; after which it is again removed two feet, and a third row of plants fet in, which finifhes the bed; the work proceeding in this manner till the whole of the plantation is completed. In this way each bed contains three rows of plants, at two feet diftance each, three feet being left between the rows on the different beds."

But "in Holland, where the culture of this root is extenfive, their method is, it is obferved, a little different from the above. The plants, after being taken from the older plantations about the month of May, are immediately fet in rows at the diftance of three or four inches from plant to plant, and about fifteen inches from row to row, the beds being ten or twelve feet in width, with intervals of only about two feet."

It is fuggefted that, "as in whatever manner the plants are fet, fome of them, even in the moft favourable feafons, are liable to die foon after the work has been performed, it is neceffary, in the courfe of a fortnight or three weeks, to look over the ground and put frefh vigorous plants in the places where the others have been deftroyed. By this means the plantations may be rendered more perfect and productive."

But whatever method of planting may be practifed, it is of the greateft importance to the fuccefs of the crop, "that it be kept perfectly clean from weeds, and that the mould be occafionally ftirred about the roots of the plants." The firft of thefe is accomplifhed, according to the furvey of Kent, by means of hand-weeding and hoeing during the fummer feafon, and the latter either by the ufe of a hand-hoe, or a light plough; this laft is the moft eafy and expeditious. In this manner, or by digging the intervals of the rows, the mould is alfo laid up to the plants once each year after the ftems have been removed in the autumn feafon. Where the bed practice is followed, they are fometimes earthed up in the autumn after the ftems have been cut down, by paring the intervals fomewhat in the manner of thofe of the afparagus kind. This method is, however, in general too expenfive and troublefome where the crops are cultivated on an extenfive fcale.

According to Mr. Young, the beft way of performing this culture is "to ufe the fhim, not for turning a ridge againft the rows, as the plants will yet be too weak for that operation, but merely to loofen the earth of the intervals, thereby to kill the weeds, and prepare the foil for being thrown up againft the rows by a fucceeding operation. Hand-hoeing and weeding fhould depend on the number of the weeds that arife among the plants. Let the cultivator of madder, through the whole procefs of the crop, remember, fays he, that he muft be to the full as accurate as a gardener; his foil muft be rendered little inferior to a dunghill; all weeds muft be for ever eradicated; not one muft injure the plants; his land muft always be kept perfectly loofe and well pulverized; for a crop that depends merely on the quantity of the roots, can never thrive to profit in land that is bound or in an adhefive ftate."

Whatever practice is adopted, "the crops are to be managed in this manner until the third autumn after planting, when the plants will be in a ftate to be taken up; this is known by their ftalks beginning to wither, and is generally about October. This bufinefs is performed either by trenching the land over with a fpade, or by means of the plough. The firft is the more certain, though much lefs expeditious method. In executing it, the workmen dig along the rows to the depth of about two feet, breaking and reducing every fpit of earth as perfectly as poffible, each being attended by two perfons, who pick out the roots of the madder. But when the planting has been done in narrow beds, it is fometimes the practice to take the roots up by turning the earth into the intervals by a *fpud*, or broad three-tined fork. In this way it is fuppofed that the roots are taken up more perfectly, and with lefs danger of being injured. But the moft ready method is by means of the plough, which after having the earth-board and coulter removed, is paffed along each fide of the rows, fo as to fully loofen the mould; perfons being employed to pick out the roots, loofening fuch parts of the earth as may have efcaped the action of the plough by their fpades." And "when the roots have been taken up, they fhould be expofed fome time to the air, in order that they may be rendered fo dry as to be cleared from dirt. They are then to be conveyed to a kiln, fuch as is employed for the purpofe of drying malt, or hops, when they are to be brought into fuch a ftate of drynefs as to be perfectly brittle. This is to prevent the danger of their being injured by becoming mouldy, or from running into a ftate of fermentation; but much caution is neceffary in conducting the procefs. After this they are packed up in bags, in order to be difpofed of to the dyer, who reduces them into a powder by a mill before they are made ufe of as a colouring ingredient." Mr. Young, however, obferves, that he is "informed, that at prefent (1803) the largeft quantity of madder ufed in our manufactures, is ufed without being powdered as formerly, and that it is faleable with common drying, without ftove-work; but that, that common degree is open to much uncertainty, fo that the preceding remarks are not done away. The price of 4*l. per* hundred weight, marks a confiderable deficcation in his opinion."

It is hinted, that in order to judge of this root, the beft is that which, on being broken in two, has a brightifh red or purplifh appearance, without any yellow caft being exhibited.

It is ftated, "in order to collect the feed of the madder plant, it is neceffary to let the plants remain in the field till the feed is almoft wholly ripe, which is generally in the month of September. The heads are then to be feparated from

from the stems, and exposed in a cloth in the sun, till the seed can be easily forced out by slightly beating them. It is then to be rendered perfectly clean, and afterwards placed in a sunny situation, until it become quite dry; for if the least dampness remain, it will grow mouldy, and its vegetative power be either greatly impaired or wholly destroyed. When thus properly dried, it should be put in small bags, and hung up to the ceiling of a room where a fire is constantly kept."

The produce from the root of this plant is different, according to the difference of the soil; but mostly from ten to fifteen or twenty hundred weight, where they are suitable to its cultivation.

It seems not improbable, a late writer says, "that the cultivation of madder might be rendered a profitable article of field-husbandry in different districts, if the importation of the root from Holland was prohibited; as the event of different trials has shewn that full crops of good madder are capable of being raised." And it is supposed by the intelligent writer of the Survey of Kent, "that if the price was never lower than 3*l.* the hundred weight, it might be grown not only with profit by the farmer, but without injury to the consumer." As it is supposed, "from the high degree of culture which land under this sort of crop must necessarily undergo, and its not being so much exhausted as in many other cases, that it must be an excellent preparation for wheat, or any other crop that requires a clean and fine pulverized condition of the mould or soil."

But the author of the Farmer's Calendar "recommends the young farmer to remember that the culture of these plants, applicable only to the use of manufactures, and which are also largely imported from abroad, is rarely advisable. He was a madder planter once, and lost by every acre he planted. A man may plant at the moment of a high price, and take up his crop three years after at a low one. All such speculations are too hazardous; nor was there even a fair open competition among the purchasers. Those who have cultivated madder with the success boasted by the writers of husbandry, should not hold these observations in contempt. There appears to him almost as much use in mentioning trials that were unsuccessful, as in those that are ever so profitable; for it is certainly of as much consequence to tell one man that his soil *will not do* for madder, as to assure another that his *will do.* Instead of an acre or two, he might possibly have launched (like many others) into ten or fifteen acres; in which case, the loss would have been no trifle. And it is surely highly incumbent on every one to make known to the world such of his experience as will probably be of any use to it. Bad success of several persons in a culture is too apt to prejudice others in general against it. However irrational, still it is so; and it ought to be a caution not to recommend any thing in general, under the extravagant notion, that because an article of culture is profitable on one soil, it must be the same on very different ones. But the grand obstacle to the culture of madder is the difficulty of sale: for while a man has not a fair market for his unmanufactured madder, none can with any prudence engage in it, unless on so large a scale as to admit the whole apparatus of reducing it to such a state as to be absolutely a marketable commodity. In answer to this it may be said, that madder really dry is a *marketable commodity.* But this matters not, if the purchaser has it in his power to be a knave: he has a pretence, a screen always at hand that will cloak the greatest knavery, and to a degree known in no other branch of agriculture. Among the gentlemen of trade who have a mutual understanding and confidence, such objections appear trivial; but to the cultivator at a distance from the market, it is a different affair. He writes to a madder-merchant to know the price. The answer is, *4l. an hundred weight.* Up he sends his madder, and instead of 4*l.* he receives but 3*l.*, not from a variation in *price,* but in *weight.* It may be said, that the correspondent in London may be right. Very true; but will the countryman believe it? He thinks himself right, and has no other proof that he is not so but the interested assertion of the man who buys it. Is it not evident that, in such a case, the cultivator will be disgusted, and throw aside a business in which he knows neither the market-weight nor the market-price? If encouragement is designed to this culture from any quarter, it should not be exclusive of this circumstance. Manufactures should be erected and established, in which the madder could be prepared for any one, at so much an hundred weight, and that by persons not the least concerned in purchasing. Then the cultivator would have a commodity in his hands, which he could sell in as simple and fair a way as any other. If nothing of this sort can be effected, all encouragement should be for such a number of acres (and no less) as will answer the expence of a private manufacture; which would prevent persons being unguardedly drawn in, by premiums apparently considerable, to cultivate a root which, when raised, is in its sale absolutely at the mercy of the purchaser."

Kilns are often necessary in the culture of this root; but for small crops, a common oven may serve, though it is very tedious, and would require large ovens to supply the place of kilns. However, to save the expence of building such kilns, a place may be made over the roof of the oven, to put the roots in, that they may begin to dry. Where much madder is grown, it is, notwithstanding, absolutely necessary to have a kiln proportioned to the quantity that is to be dried. These may be made of different forms, being attentive that it may contain a large quantity of roots; that it be worked with ease, and the smallest proportion of fuel; and that it may be so contrived as to retain an equal moderate heat.

Those made use of in the Low Countries differ very little from that used here in drying malt. There is a large furnace, in which a great fire is made: this furnace is made under an arch; the hot air and smoke pass through a funnel over the furnace, and spread themselves in a space in form of an inverted pyramid, the bottom of which is covered with a perforated floor, on which the madder-roots are spread. See KILN.

And where the manufacture of the article is carried on, a mill for the purpose of pulverizing the dried madder is likewise necessary. See MILL.

Expences of Culture per Acre.—This is on land worth forty shillings *per* acre, in the digging mode, and before the great rise in the price of farm labour.

	£	s.	d.
Rent for three years	6	0	0
Digging ditto at two-pence *per* perch	1	6	8
Dividing ditto into beds, two men one day, at one shilling each	0	2	0
Raking ditto, two men one day, at one shilling each	0	2	0
Planting ditto with two thousand plants, one day, at one shilling and sixpence each	0	3	0
Six women to take up two thousand ditto, at sixpence each, one day	0	3	0
Hoeing the first summer five times	0	15	0
Covering ditto in autumn the first year	0	6	0
Carried over	8	17	8

Brought

	£	s.	d.
Brought over	8	17	8
Hoeing ditto the ſecond ſummer three times	0	9	0
Covering ditto in autumn the ſecond year	0	6	0
Hoeing ditto the third ſummer twice	0	4	6
To be paid in lieu of tithe, at five ſhillings *per* acre *per annum*	0	15	0
Digging ditto out of the ground	5	0	0
Beer	0	6	0
	15	18	2

Produce.

	£	s.	d.
Produce of an acre of madder	52	12	2
Expences	15	18	2
Profit	36	14	0

In this eſtimate, which is much below the preſent price, nothing is allowed for plants; as, though expenſive at firſt, when once done, a ſupply from the plantation will conſtantly be had for a long time.

Madder, in *Botany* and *Gardening*. See Rubia.

Madder, in *Law*. See Larceny.

Madder, in the *Materia Medica*. The roots of madder were employed by the Greek writers with the ſame medicinal intentions for which they are recommended by moſt modern writers on the materia medica. Madder differs from ſome other ſubſtances uſed in dyeing, by its property of tinging with a florid red colour, not only the milk, urine, &c. but the bones of thoſe animals which have fed upon it. This circumſtance was firſt noticed by Antonius Mizaldus, (Memorab. ut. ac jucunda Cent. 7. Aph. 91. Lutet. 1566.) but not known in England till Mr. Belchier publiſhed an account of a pig and a cock, whoſe bones became red by eating madder mixed with their food. (Phil. Tranſ. vol. xxxix. vol. xli.) Since that time various experiments have been made, by M. Hamel du Monceau and others, from which it appears that the colouring matter of madder affects the bones in a very ſhort time, and that the moſt ſolid or hardeſt part of the bones firſt receives the red colour, which gradually extends, *ab externo*, through the whole oſſeous ſubſtance, while the animal continues to take the madder; and if the root be alternately intermitted and employed for a ſufficient length of time, and at proper intervals, the bones are found to be coloured in a correſpondent number of concentric circles. Mem. de l'Acad. des Scienc. 1739. Med. Eſſ. Edinb. abr. vol. ii.

According to Lewis (Mat. Med.), the roots of madder have a bitteriſh, ſomewhat auſtere taſte, and a ſlight ſmell not of the agreeable kind. They impart to water a dark red tincture, to rectified ſpirit and to diſtilled oils a bright red: both the watery and ſpirituous tinctures taſte ſtrongly of the madder.

By medical writers, madder has been conſidered as a deobſtruent, detergent, and diuretic, and is chiefly uſed in the jaundice, dropſy, and other diſeaſes, ſuppoſed to proceed from viſceral obſtructions, particularly thoſe of the liver and kidnies; and ſome modern authors have recommended it as an emmenagogue (Home's Clin. Exp.), and in rickety affections. (Levret ſur les Accouchemens.) With regard to its diuretic quality, for which there are ſeveral reſpectable authorities, Dr. Cullen aſſerts, that in many trials, both for this and other purpoſes, ſuch an effect is not conſtant, as it never occurred to him. As a remedy for the jaundice, it has the authority of Sydenham, and was formerly an ingredient in the icteric decoction, which the college of Edinburgh directed to be prepared by boiling an ounce of madder, the ſame quantity of turmeric, and the ſame quantity of the roots and leaves of celandine, in three pints of water to a quart; to which, when ſtrained and cooled, the juice of 200 millepedes are added; and a quarter of a pint of this liquor was ordered to be taken twice a day, or oftener. But as this decoction ſeemed to be more adapted to the "fæces albidæ," than to the diſeaſe itſelf, it was expunged from the Pharmacopeia. That ſome French writers ſhould preſcribe madder in a rickety ſtate of the bones, appears a little ſurpriſing, ſays Dr. Woodville, as the brute animals to which it was given, eſpecially the younger, ſuffered conſiderable emaciation and proſtration of ſtrength from its effects. Its virtues, as an emmenagogue, reſt principally on the authority of Dr. Home, who gave from a ſcruple to half a dram of the powder, or two ounces of the decoction, three or four times a day. But this medicine failed with Dr. Cullen, who alſo ſays, (Mat. Med. vol. ii.) "I know of other practitioners in this country, who, after ſeveral ineffectual trials made with it, have now entirely deſerted its uſe." Woodv. Med. Bot.

Madder, *Rubia Tinctorum*, in the *Arts and Manufactures*, grows wild in many parts of the Levant, as well as in the ſouth of Europe, and has been very largely cultivated in Holland, particularly in Zealand, and alſo in the northern parts of Europe, for the uſe of the dyers and calico printers. (See Dyeing.) The method of cultivating it in Holland is this: in autumn they new plough the land, where the madder is to be planted, if it is ſtrong and heavy, laying it up in high ridges, that it may be mellowed by the winter's froſts. In March they plough it again, working it very deep, and laying it in ridges at eighteen inches aſunder, and about a foot deep. Then, in the beginning of April, when the madder begins to ſhoot out of the ground, they open the earth about the old roots, and take off all the ſide ſhoots, which extend themſelves horizontally juſt under the ſurface of the ground, preſerving as much of the root as may be with them. Theſe they plant immediately on the tops of the new ridges, at about a foot diſtance from each other; and this they uſually do in ſhowery weather, when the plants immediately take root and require no more water. In theſe ridges they let the plants remain two ſeaſons, keeping them clear of weeds; and at Michaelmas time, when the leaves are fallen off, they take up the roots, and dry them for the market. See Rubia.

The madder-plant grows to about three feet in height, but it is the long-ſpreading fibrous root that is uſed in dyeing. The madder of the Levant, called "Lizari," or "Azala," has a ſomewhat higher and finer colour than that of the Dutch; but that of Holland is more carefully prepared. The Dutch method is as follows: the roots, as ſoon as they are gathered, are put under a ſhed, or in a granary, or other ſheltered place, and there remain, expoſed to a current of air, for ten or twelve days, till they are quite pliable, and till no juice can be preſſed out by ſqueezing them. They are then farther dried, either in a common oven of ſlack heat, if the quantity be ſmall, or in large ſtoved rooms, conſtructed for this purpoſe, and heated with turf, a large opening being left for the eſcape of all the internal vapours. This proceſs requires particular attention and management. When the roots are quite hard and brittle, they are laid on a threſhing-floor, and beaten with a flail, in order to ſeparate the dirt and outer thin ſkin; they are afterwards ground in a mill, and the powder, being ſifted and ſorted, is carefully

fully packed in large barrels: it is thus exported, and in this ftate ufed by the dyers. For the method of cultivating and preparing madder in England, fee the article RUBIA. The method practifed in Turkey and Perfia for preparing the madder ufed in the beautiful Adrianople red, is ftated by an eye-witnefs, cited in Aikin's Dictionary, to be as follows: For every 100lb. weight of the frefh root, a fteeping liquor is prepared of 2lbs. of bran, and 1lb. of honey and alum, in four gallons of water. The roots, having been previoufly wafhed clean, are foaked in this liquor for two or three days, and then dried, firft under cover, and laftly in the fun. They are afterwards ground and fifted, the powder laft produced in the mill being of the beft quality.

The powder of madder fhould not be dry and harfh, but feel fomewhat greafy, and adhere together under the fingers. Madder-root confifts of three parts, *viz.* the fkin or cuticle which is rubbed off under the flail, and is of no ufe; a thicker bark or cortical part, and within this a woody portion. Thefe two latter parts are of a high red, and both are intermixed with many yellowifh particles, which injure the red colour, but cannot be feparated in grinding the root. When the colour is extracted in the dyeing vat, the red part is lefs foluble in water than the yellow, and is not fo readily extracted; and, therefore, the beauty of the red colour is deteriorated by long boiling, and by ufing too large a quantity of the root. In the ftate of madder, when ufed by the dyers, it is an orange brown powder, liable to become damp, and to be fpoiled in a moift place. As to the chemical properties of madder, we fhall detail the following experiments by Mr. Wali, from Berthollet Elem. de Teinture, vol. ii. Zealand madder of the beft quality, was of an orange-brown colour, and in moderately fine powder. This powder, with water, gave an orange-red infufion, by maceration with or without heat, but in the latter cafe the colour was finer. By flow evaporation of the infufion, or decoction in a fhallow veffel, a pellicle is gradually formed, and finks to the bottom, and is fucceffively replaced by others. The extract, when nearly dry, is of a dingy brown, and is only in part again foluble in water. Alum added to the infufion gives a precipitate of a very deep brown-red, and the fupernatant liquor affumes a brownifh-yellow tinge. If the alkaline carbonats be added to this liquor, they give a blood-red lake, mifcible with oils, but very inferior in beauty to the cochineal lake. With an excefs of alkali, the precipitate is re-diffolved, and the liquor becomes red. The colour given by foda is not fo fine as that by pot-afh. Lime precipitates a brown-red lake, having no beauty. The acids added to all infufions of madder turn it yellow, but form no precipitate. The natural colour is again reftored by alkalis. Carbonat of magnefia, added to the water in which madder is infufed, turns it of a clear blood red colour, which, when fpread upon paper, becomes yellow by the fun's rays. The following effects are produced by different metallic folutions: acetate of lead, added to the aqueous infufion of madder, gives a brownifh-red precipitate; nitrat of mercury a purple-brown; fulphat of iron a beautiful clear brown; and fulphat of manganefe alfo a purplifh-brown. The folutions of tin, as Berthollet obferves, produce a lake void of brilliancy and beauty, owing, as he conjectures, to the precipitation of the yellow as well as the red particles of madder, fo that this metal, which ferves to heighten the beauty of cochineal, can hardly be ufed with any advantage for madder. Sir Henry Englefield has invented a method of extracting the red of madder of lakes, for which he obtained the gold medal from the Society of Arts. (See Tranf. of the Society, vol. ii.) His method is founded on the difcovery that the red colouring part is fcarcely foluble in cold water, but in the ufual method of extraction is chiefly fufpended by means of the mucilage of the root. His principal procefs is as follows: Inclofe two ounces (troy weight) of the fineft Dutch madder, known in commerce by the name of "crop madder," in a bag capable of containing three or four times that quantity, made of ftrong and fine calico. Put it into a large marble mortar, and pour on it a pint of foft river water, preffing the bag in every direction, and rubbing it as much as poffible without danger of burfting; the water will foon become quite opaque, and loaded with colouring matter. Pour off the water, and add another frefh pint of water, triturating it with the madder as before; and repeat the operation, till the water, the laft added, comes away but flightly tinged. About five pints will be required to exhauft the colour, after which the root, if taken out dried, will be found to have loft $\frac{1}{16}$ths of its weight, and alfo its peculiar fmell; and the colour will be a light nankeen or cinnamon. The water loaded with the colouring matter muft then be put into an earthen or well-tinned copper veffel (not iron) and heated till it juft boils. Then pour it into a large bafon, and add an ounce of alum diffolved in a pint of hot foft water, carefully ftirring the mixture. Afterwards add about $1\frac{1}{2}$oz. of a faturated folution of carbonat of potafh, which will immediately excite an effervefcence, and a fubfequent precipitation of a coloured lake. When it has ftood till cold the lake is to be collected, well wafhed with repeated quantities of warm water, and gently dried. It will then be found to weigh about half an ounce, or a fourth part of the madder employed. This madder lake, which is very beautiful, is found by analyfis to confift of more than 40 *per cent.* of alumine, the remainder is the colouring matter of the madder. If the alum folution and the madder infufion, without the alkali, be fuffered to ftand for a while, a dull red lake will equally precipitate, and the clear liquor will afterwards yield a beautiful ooze-red lake by alkali, but wanting a fufficient body of colour. A lake equally good with the firft mentioned, but of a lighter colour, will be afforded by previoufly allowing the madder and cold water to ftand for a few days in a moderately warm place, by which a flight fermentation will be induced, and a portion of the mucilage of the root deftroyed. The procefs is then to be continued as before. The fame ingenious experiments alfo fucceeded very perfectly in obtaining a ftill more beautiful and equally durable lake, from the frefh madder-root imported from Holland, packed up in mofs. Aikin's Dict.

Wool, previoufly boiled in a folution of alum and tartar, receives from a hot decoction of madder and tartar, a very durable, but not a very beautiful red colour. M. Margraaf (Berlin Mem. 1771) fhews how a very durable lake, of a fine red colour, fit for the purpofes of painting, may be obtained from madder. The procefs is as follows: take two ounces of the pureft Roman alum, and diffolve it in three (French) quarts of diftilled water that has boiled, and in a clean glazed pot. Set the pot on the fire, and when the water begins to boil, withdraw it, and add to it two ounces of the beft Dutch madder. Boil the mixture once or twice, then remove it from the fire, and filtrate it through a double filtre of paper not coloured. Let the filtrated liquor ftand for a night to fettle; and pour off the clear liquor into the glazed pot, well cleaned. Make the liquor hot, and add to it gradually a clear folution of falt of tartar in water, till all the madder is precipitated; filtrate the mixture, and upon the red precipitate which remains upon the filtre, pour boiling diftilled water, till the water no longer acquires a faline tafte; the red

red lake is then to be gently dried. The colour of this precipitate is deep; but if two parts of madder be ufed to one part of alum, the colour will be ftill deeper: one part of madder, and four parts of alum, produce a beautiful rofe-colour.

Madder, *Littlefield*, in *Botany*. See Sherardia.

Madder, *Petty*. See Crucianella.

MADDIGUBA, in *Geography*, a town of Hindooftan, in the circar of Gooty; 10 miles from Anantpour.

MADDIGUER, a town of Hindooftan; 12 miles N.W. of Gooty.

MADDORPETTA, a town of Hindooftan, in Myfore; 19 miles N.E. of Seringapatam.

MADDOX, Isaac, in *Biography*, who arrived at the higheft honours of the church, was defcended from parents of rather mean rank in London. Of thofe parents he was deprived while very young, and he was placed in a charity-fchool, where he imbibed a tafte for ufeful knowledge. An attempt was made to put him apprentice to a paftry-cook, but his love of reading, and his defire after learning, feem to have unfitted him for that employment, and he was, by the intereft of his friends, allowed to purfue his ftudies at one of the Scotch univerfities. It has been faid, but the fact feems at leaft doubtful, that he became a preacher among the diffenters for a fhort time. It is certain that he refufed to take orders in the church of Scotland, and, probably by his talents, obtained the patronage of bifhop Gibfon. He was, by the intereft of the learned prelate, admitted of Queen's college, Cambridge, and foon after received epifcopal ordination. He was firft appointed curate of St. Bride's, and then domeftic chaplain to Dr. Waddington, bifhop of Chichefter, whofe niece he married, and was afterwards promoted to the rectory of St. Vedaft, Fofter-lane, London. In the year 1729 he was appointed clerk of the clofet to queen Caroline, about which time he was created a doctor by a diploma from Lambeth. In 1733, he was made dean of Wells, and in the fame year he publifhed "A Vindication of the Government, Doctrine, and Worfhip of the Church of England, eftablifhed in the Reign of Queen Elizabeth." The work was a fort of anfwer to, or attack on, Neal's Hiftory of the Puritans. This defence of the church, together with his intereft by marriage and otherwife, paved the way for his preferment, and he was in 1736 confecrated bifhop of St. Afaph, from which fee he was tranflated to that of St. Afaph in 1743, and from thence to Worcefter. Excepting the volume already referred to, the bifhop publifhed only fourteen fingle fermons, preached on public occafions, between the years 1734 and 1752. The bifhop died in 1759, about the age of fixty-two. As a prelate, he difcharged the duties of his ftation with fidelity and much diligence: in the government of the clergy he acted the part of a prudent and affectionate father. He was always liberal, and in many inftances munificent: during his life, he gave two hundred pounds a-year towards the augmentation of the fmaller benefices of his diocefe. He was a zealous encourager of public and benevolent inftitutions. To the London hofpitals he was a great benefactor, and was among the firft promoters of the Worcefter infirmary. In his manners he was diftinguifhed for cheerfulnefs, affability, and good nature, and was at all times above the falfe pride of concealing his humble origin. At one of his entertainments he preffed the company to tafte his paftry, faying he believed it was good, but he could affure them that it was not of his own manufacture. Gen. Biog.

MADE Streams, in *Agriculture*, fuch as are formed by art, as in the cafe of irrigation, &c.

MADEE, in *Geography*, a town of Hindooftan, in Tellingana; 38 miles of Warangole.

MADEIRA, a well-known ifland in the Atlantic, of which Funchal, fituated near the eaftern extremity of the fouth coaft, is the capital and bifhop's fee. The firft fight of the ifland is peculiarly magnificent to thofe who have never travelled beyond the Britifh channel. The entrance to the bay affords a moft beautiful profpect of the city of Funchal and of the furrounding country, which from every part of the coaft rifes fo fteep as to bring very diftant objects into a fore-ground, like a Chinefe landfcape. As high as the temperature will admit the hills are clothed with vines, in the midft of which a white manfion, at agreeable diftances, is difcovered, and on the higheft habitable part of the hill is an elegant chapel, dedicated to Noffa Senhora de Monte. To the left of this is a beautiful country feat, with a fine hanging wood, erected by the late conful, Mr. Ch. Murray, and fince purchafed by a Portuguefe nobleman. Above this the mountain is covered with woods or verdure, as high as the fight can diftinguifh, and indeed in every part, excepting thofe columnar peaks, the foil of which has been wafhed away by the violent rains to which thofe latitudes, and particularly fuch elevated parts, are liable. The whole ifland is faid to be about 40 miles in length, and 11 in its greateft breadth. The altitude of Pico Ruivo, its higheft land, taken by the barometer and thermometer according to M. de la Luc, is eftimated at 5068½ London feet. To Mr. Johnfon, called by the Portuguefe the accomplifhed Englifhman, we are indebted for an accurate map of Madeira, and many other very valuable remarks. Though partner in a confiderable mercantile houfe, he was a well-educated man, and always turned his acquirements to the benefit of others. His obfervations, confirmed, we believe, by the quadrant, eftimated the peak fomewhat higher. This is, however, nearly an Englifh mile, elevated on a furface of about five miles on each fide, which is enough to give an idea of the prodigious fteepnefs of every part of the ifland. From Pico Ruivo, fituated nearly at the eaftern extremity of the mountainous part, there is a kind of table land, running weftward for more than twenty miles, in fome parts extremely narrow, and from its elevated fituation fo tempeftuous during the winter, that no habitations are found in its whole extent. This is called Paulo da Serra, and is faid to be level ground, a comparative term in an ifland, the furface of which is fo univerfally uneven. The following account of the geology of Madeira is offered as the moft recent, though in many refpects imperfect, from the fhort ftay of the honourable H. G. Bennet, to whom we are indebted for it.

"It confifts," fays that gentleman, "of a fucceffion of lofty hills rifing rapidly from the fea, particularly on the eaftern and northern extremities. The fummits of many of thefe ranges prefent the appearance of what has been called a table land; yet occafionally the forms are conical, and furmounted by a peak, which in fome inftances I found to be of columnar bafalt. Deep ravines or vallies defcend from the hills or *ferras* (fo called from the interfections the eye meets with in viewing from below the different chains of mountains) to the fea, and in the hollow of moft of them flows a fmall river, which in general is rapid and fhallow. The foil of the ifland is clay on the furface, and large maffes of it as hard as brick are found underneath. Though there are not at prefent any exifting volcanoes in the ifland, yet the remains of two craters are to be feen, one on the eaftern, the other on the weftern fide, the largeft being about a Portuguefe league, or four Englifh miles, in circumference. Every thing around wears marks of having

 fuffered

ſuffered the action of fire; yet I was unable to diſcover any depoſit of ſulphur, and was told that none had hitherto been found in the iſland.

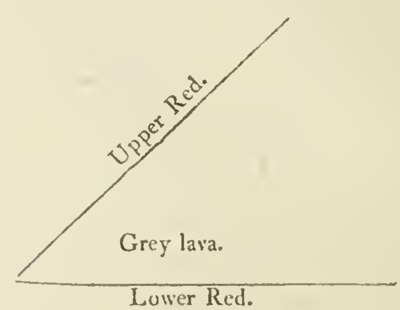
"The varieties of ſtrata, which I ſhall term generally lava, are not numerous. I myſelf ſaw but four, and I was informed there were no more to be met with Three of them were invariably alternating in the ſame order. The firſt or loweſt lava is of a compact ſpecies, containing few, if any, extraneous ſubſtances, is of a blue colour, and of a remarkably fine grain. Upon that, the ſecond, which is a red earthy friable lava, reſts; ſometimes ſeparated by beds of clay mixed with pumice, and layers of black aſhes and pumice. This red lava contains minute pieces of olivine; ſometimes it aſſumes a priſmatic form, and in one place was of a moderate degree of hardneſs: the principal ſprings of water in the iſland iſſue from this ſtratum. On the top is the third, a greyiſh lava, generally compact, though at times near the ſurface very cellular, and containing much olivine. This lava takes principally the priſmatic form of baſalt. I have ſeen it in the moſt perfect priſms from 30 to 40 feet or more in height, the ſurface being covered with ſcoria, aſh, and pumice. Theſe maſſes of lava contain more or leſs of what I conſider to be olivine, occaſionally carbonate of lime and zeolite, which laſt aſſumes either a cryſtallized or globular form, or is diffuſed in a thin coating between the different layers.

"The fourth ſpecies of lava is of a coarſe grain, is uſed for the making of walls, and the commoneſt and pooreſt houſes are built of it, the blue and grey lavas being uſed for the copings, &c. It works eaſier than the two other kinds above mentioned, is more friable and ſoft, and its colour is a mixture of brown and red. I obſerved it in a ſtratum by itſelf, and it did not ſeem to have any connection with the other three kinds.

"Theſe are the principal ſtratified lavas that the iſland affords; but in the beds of the rivers, particularly in that which flows in the valley of the Corral, ſeveral varieties occur in iſolated maſſes, containing olivine and zeolite in greater or leſs quantity, and exhibiting detached portions of ſtrata, ſimilar to thoſe that are found in the Foſſa Grande on the ſide of Veſuvius.

"I alſo examined the coaſt to the weſtward of the town of Funchal. From the beach before the town to Illhoo Caſtle, and beyond it to the land called the *Punta de la Cruz*, the general character of the coaſt is as follows: The red ſtone is the apparent baſe upon which reſts a bed of grey priſmatic lava, the ſtratum being ſometimes from 40 to 100 feet in depth. At times this grey lava reſts upon a deep bed of aſhes and pumice, agglutinated together like the *peperino* and *puzzolano* in the vicinity of Naples. The ſcoria at the ſurface is remarkably thick, and all the upper parts of the lava appear to be cellular. The general dip of the lava on the coaſt near Funchal is to the north, but near the fort of Illhoo it forms with a maſs of pumice that is interſected with ſlight veins of carbonate of lime and zeolite, a rapid angle or curve of declination to the eaſt. To the weſtward of the fort, the lava is not found for a little diſtance, and there is nothing but deep beds of pumice and the agglutinated maſs above mentioned. Theſe beds of pumice are of various thickneſs, the deepeſt appearing to be about four feet, and alternating with that ſtratum which I have called *peperino*. In different cavities of the pumice bed, there are large depoſits of black aſhes. Towards the extremity of the ſtrata the red ſtone appears on the ſurface in a more ſolid ſtate, and lies in priſmatic maſſes, the priſms being ſmall, and not exceeding a few inches in diameter. Their ſubſtance is brittle, and crumbles with eaſe. This ſtratum of red lava is of a ſhort continuance. Paſſing a ſmall brook, it dips rapidly to the weſtward, and in its place the grey lava is found in a confuſed though ſometimes priſmatic form, and riſes from the beach, while the red lava ſtill runs along the ſurface to the height of near 100 feet, the top being covered with a thick ſcoria.

"There is alſo in the vicinity of Funchal, to the eaſtward of the town, a fall of water, which, independent of the romantic beauty of the ſituation, merits being viſited on account of the expoſure of the two ſtrata of lava in their relative poſition. The hills are compoſed wholly of lava, ſometimes of a confuſed, ſometimes of a priſmatic formation, the red and grey lavas being viſible on both ſides of the valley. Near the head of it, a ſhort diſtance from the caſcade, the red ſtratum is at the bottom, and about 60 feet higher it re-appears, and again, about 200 feet higher, alternating with the grey lava. The upper red lava dips rapidly to the ſouth, and the ſtrata are diſpoſed in the following manner:



"The rock, down which the caſcade falls, is alſo interſected with a red ſtratum of about three feet wide, that traverſes it, and dips to the weſtward, and is broken off by a broad dyke of grey lava. It appears about 30 feet higher, and dips again to the weſtward. The ſubſtance of the red rock in this place is hard, and it breaks into a columnar form, being by far the moſt compact of the red ſtrata I met with in the iſland. I ſaw this red lava alſo in the iſland of Teneriffe, to the eaſtward of Santa Cruz, as well as in the neighbourhood of Orotava."

From the ſides of Pico Ruivo ariſe three principal rivers, which traverſe the iſland in different directions. Beſides theſe are two very conſiderable fountains on the table land, and various other tributary ſtreams. This command of water at ſuch a height is a moſt munificent bleſſing of providence in a country uſually free from rain for more than ſix months of the year, the ſteepneſs of which renders the rivers in their natural forms little better than cataracts. By diverting the water to the ſides of the mountains by regulations long eſtabliſhed among the coloniſts, tracts of land are fertilized, which muſt otherwiſe remain for ever unproductive, or exhibit only trees and prickly pears (cactus mamillaris) whoſe roots would often become bare by the torrents of the rainy ſeaſons.

The following is the popular tradition of the diſcovery of Madeira. One Machin, an Engliſhman of obſcure birth, had fallen in love with a young damſel, called Anne d'Arſet, of exquiſite beauty, and of a noble family, which diſdaining ſo low an alliance, though Machin had gained her affections, obtained a warrant from the king to keep him in priſon, until the lady was perſuaded to marry a nobleman, who took her immediately to his ſeat near Briſtol. Machin, being ſome time afterwards releaſed, found means to convey the lady on board a veſſel provided to carry them to France.

France. When they were far at fea, a ftorm arofe, and they were toffed for thirteen days on the waves out of fight of land. At length they perceived fomething that appeared like an ifland, overgrown with wood. The fhip foon came to anchor, and Machin and the lady, with a few attendants, went on fhore. In the courfe of the night a tempeft drove the veffel from her anchor, and carried her to the coaft of Barbary, where fhe was wrecked, and the feamen made captives by the Moors. The lady, affected by this difafter, died in a fhort time, and Machin, through grief, foon followed her. Their attendants, rendered defperate by the lofs of their conductor, quitted the ifland, and betaking themfelves to their open boat, put out to fea, without knowing what courfe to fteer. After a feries of adventures, they fell in with a Spaniard, who, delighted with their ftory, communicated it to Gonçalves Zargo, fent out by the king of Portugal on a voyage of difcovery, and prevailed upon him to fail in fearch of the ifland, who in a little time found it.

This ftory, though unnoticed by De Barros, the Livy of the Portuguefe, is not only authenticated by a contemporary hiftorian, but, after a very minute inquiry of the late Rev. Mr. Roberts, we are affured, ftands on as fair a foundation as any other hiftorical fact. The gentleman we allude to, being a clergyman of the Roman Catholic perfuafion, and a native of Oporto, had the moft favourable opportunities of afcertaining the fact, which diligence, knowledge of the languages, and accefs to every library, could afford him, and expreffed his firm perfuafion that the legend of Machin was, if not in all, at leaft in moft, refpects true. At Mecheco, a town in the eaftern extremity of the ifland, a fmall chapel was fhewn, of which the following was the hiftory given by the inhabitants. That the Englifhman (Machin), on the demife of his wife, had erected a crofs, with an infcription, requefting that fhould hereafter any Chriftian by chance refort to the ifland, a chapel might be built, in which maffes fhould be performed for the foul of his Anne: that the above chapel was erected on the fpot, and the crofs, made of cedar, was preferved near the altar. This crofs was always exhibited. It was, however, much diminifhed, on account of fmall pieces given gratuitoufly to different vifitors, infomuch that it was at laft nailed to another and larger wooden crofs, to preferve its form, and keep it together. This chapel had certainly greater marks of antiquity than any other building in that town. It was unfortunately wafhed away in that memorable flood which occurred in October 1803; fo that, at this time, nothing remains to commemorate the event but the picture above alluded to, in the caftle hall.

De Barros, who confiders the ifland as difcovered by Gonçalves Zargo, informs us, that as foon as it was divided into captainfhips (Mecheco and Funchal), the firft ftep taken by the new fettlers was to fet fire to the trees, the foreft being every where impenetrable. Nothing can be better confirmed by every fpecies of evidence than thefe facts, and that the ifland derived its name from the quantity of its wood. The word Madeira has the fame fignification as the Latin *materia*, from which it is only vernacularifed, the Portuguefe frequently fubftituting *d* for the Latin *t*, and tranfpofing the *r* from its fituation with its connecting vowel; of which we need give no more familiar inftances than *padre* and *fradre* for *pater* and *frater*, when ufed in a fpiritual fenfe. That *materia* is the claffical term for foreft trees, we have the authority of Cæfar in his Commentaries, who remarks of Britain, " *Materia* cujufque generis, ut in Gallia, eft; præter fagum et abietem." At this time the trunks of immenfe cedars are often difcovered, but all the original trees themfelves feem extinct, and, in the inhabited part of the ifland, to have given place to chefnut trees. The land is fuppofed to have derived its great fertility from this conflagration, which is faid, and with much probability, to have continued in different parts for feven years. But it is well known that no land could be fertilized by fuch an event for three centuries; and the account we have given of the nature and quantity of the vegetable ftratum, joined to the abundance of water, and a favourable temperature, is fufficient to explain all the fertility it really poffeffes. Though the vines grow luxuriantly, and produce abundantly, wherever they have a fufficient depth of foil, plenty of water, and a favourable afpect, yet the corn-lands require all the cultivation and occafional fallows of other lefs favoured countries. At the fame time, it is no fmall boaft of the iflanders that their country produces the beft wheat, the pureft fugar, and the fineft wines in the world, befides being bleft with the cleareft water, the moft falubrious air, the mildeft climate, and a freedom from all noxious reptiles. Their wheat and fugar are fuch as are produced in the Mediterranean iflands; but their wine, though originally brought from that fource, infinitely furpaffes all other in ftrength, delicacy of flavour, and drynefs, befides the advantage of improving by being kept for any length of time, and even in fouthernmoft latitudes.

The mode of producing a good crop of wheat, at a diftance from the town, is by a previous cultivation of the common broom. This is cut for fuel, and, after a time, grubbed up, and burnt on the foil. By thefe means, a crop of wheat is infured for a fucceffion of years, more or lefs, according to the foil; after which the fame procefs is again reforted to. For this purpofe, the feeds of the broom are collected, and generally bear the fame price by meafure as wheat. With all thefe affiftances, the quantity of wheat produced is faid not to equal a third of what is confumed, though maize is the principal food of the peafantry. Sugar is no longer cultivated as an object of traffic. Thofe fidalgos, who have plantations, ftill keep them up chiefly for their own ufe, and prefents for their friends. Immediately after the fugar harveft, a fmall trade is carried on by manufacturing fomething like barley-fugar, called *rapaduras*, (probably *rafpaduras*, meaning the rafpings or fcrapings of the frefh fugar,) with which moft of the natives are accuftomed to regale themfelves and children at this feafon; but for common ufe, the ifland is fupplied with fugar from the Portuguefe fettlements in the Brazils.

The wealth of the country confifts in its wines, which are cultivated with a degree of induftry proportioned to their value. To preferve the foil, it is found neceffary to erect walls along the fides of the hills, at diftances regulated by the declivity. Thefe walls are, in fome places, erected with prodigious labour. In afpects favourable for the growth of vines, if the foil has been previoufly wafhed away, fo as to leave the bare rock, even here different ftages have been erected, to which earth has been brought up, fo as to form an artificial foil for this valuable production.

It will eafily be conceived that fuch works as thefe cannot be accomplifhed without immenfe labour. When to this are added the difficulties of the roads, the vaft expence and danger with which they are made, which, from the nature of the country, will in very few places admit of wheel carriages, and the confequent inconveniences of conveying every article from the town to remote parts of the country, and alfo of conveying the wine and other productions of the country to Funchal: when all this is taken into account, it will be readily underftood that the cultivators of Madeira cannot be a flothful race. Yet becaufe men, who have been hard at work from before fun-rife, are feen refrefhing themfelves

felves with fleep in the open air, and even on the beach, during the interval allowed for reft at noon-tide, they are often confidered as indolent by ftrangers, who firft view them after fix hours' labour. Nor are the women lefs induftrious. Thofe who are young enough climb the mountains to procure broom and brufh-wood, which they bring to town, and fell for fuel. Others bring the produce of their gardens; whilft the elder ones are conftantly employed at home in fpinning or domeftic concerns.

It is true, that the increafed demand for labour in Funchal has produced a race, fomewhat fimilar to our *long-fhore* and *water-fide* men in England, who labour much too hard, and fupport themfelves under it with ardent fpirits or wine. But this is far from the character of the people.

The country is cultivated by what are called by the French *metayers*, that is, by a peafantry who divide the produce with the land-owner. Confidering the labour required for firft preparing the land, and that the produce of the wine is reckoned as nothing till the third year, fuch a return to the cultivator is very unequal. He is ufually allowed a fmall fpace for yams, or rather eddoes, *arum efculentum*, fweet potatoes, *convolvulus batata*, or other efculents. Thefe he is expected to fhare with the landlord. In this there is faid to be great collufion; but in the wine this can hardly be the cafe, on account of the tythes. The cultivators have, however, one very great intereft in the land, and confequently a great inducement to engage in thefe operofe undertakings. Whatever neceffary improvements they make, become their own: hence the walls, the vines, and even their cottage, as far as is confidered neceffary, is their own property; and though, in entailed eftates, a leafe cannot be granted for more than nine years, yet the tenant cannot be difpoffeffed till he is paid the full value of his improvements. In proportion as the increafe of commerce has rendered money of lefs value, the money-price of thefe improvements is advanced; and even the vines are eftimated, not by number, but by their age and fuppofed fertility. Hence the tenant not only furveys the property he has acquired by his own labour or expence, but fees that property yearly improving by the common operations of nature.

The tythes of this, in common with the other Portuguefe colonies, were given by the pope to the king of Portugal, as fovereign of the order of Chrift. Out of them the clergy are paid, and for the moft part very poorly. They formerly received all their revenue in kine; but, unfortunately for themfelves, petitioned to have a moiety in money. In confequence of this, by the gradual diminution of the value of money, and increafed value of every production, they are confiderable lofers. Some of them make a traffic of wine; and, on the whole, they are much lefs fuperftitious than in moft Catholic countries. Their number, both fecular and regular, is much lefs than is generally fuppofed. By fome it is faid not to exceed 300, including the monks and nuns. Of the former there is only one order in the ifland: the number of nuns is uncertain. There is a feminary in Funchal for the education of the clergy of the ifland, with fomething like an academic eftablifhment, originally, we believe, formed by the Jefuits, who erected other fchools in various parts of the country. The bifhop retains his original number of pipes of wine, befides other emoluments, which render his fituation more lucrative than the governor's. He is expected, indeed, to divide his revenue with the poor; and an inftance is often mentioned of one whofe benefactions exceeded his implied obligations.

The natives of Madeira are a very mixed race. Among the labouring clafs in the town we often recognife faces truly Englifh, and even Englifh complexions. This is faid to arife from the frequent intermixture of the two nations, not only by the Englifh fettlers, but by the conftant arrival of Englifh failors. The other inhabitants, excepting the fuperior claffes in fome parts of the ifland, are a mixed race. Befides the coloniftls from the mother country, Moors in great number were at one time imported. Spaniards alfo reforted hither during the union of the two countries; and negroes have been purchafed for this, as well as the other European fettlements. The laft were, however, few in number; their intermarriages with the natives fewer, fo that but little veftige remains of their characteriftic marks. On the whole, the male inhabitants may be called a comely race: they are, for the moft part, about the middle fize, well enough formed, with ftrong mafculine features, hair, and complexions. The women are almoft univerfally fhorter than the comparative difference would lead us to expect. Such as are engaged in the laborious employments foon lofe the few charms which youth might otherwife fupply.

The animals, natives of the country, are, as in moft mountainous parts, univerfally fmall. To an Englifhman, their beef and mutton is alfo lean and taftelefs; but thofe who are accuftomed to warm climates fpeak of them in better terms. Of poultry, the common domeftic fowls are fmall; but this is amply made up by their ducks and turkies, the latter of which are not inferior to thofe of Norfolk. Pork is peculiarly fine; but the expence of feeding, or the warmth of the feafons, makes it fuch a rarity, that it is rarely produced excepting at Chriftmas feftivals. It is true, hogs are found rambling about the towns, but very few are reared for porkers. Fifh, particularly rock-fifh, is plentiful and good of the kind; but the nature of the coaft prevents the refidence of many fhell-fifh.

The uneven form of the country renders the ifland productive of the European as well as more fouthern fruits; but it is a miftake that the true tropical fruits are readily produced. In the vallies are found guavas, bananas, and oranges. A fingle allegator pair tree has grown for feveral years, but rarely produces fruit. Pine apples are reared with great difficulty; and the *granadilla quadrangularis*, after fpreading to a great extent, and flowering moft luxuriantly, has not yet, we believe, produced ripened fruit.

The ftaple commodity of the ifland is wine, of which the average quantity made about ten years ago was reckoned between 30 and 40,000 pipes. More than half this is exported, principally to the Britifh fettlements in the Eaft and Weft Indies. A quantity, comparatively very fmall, finds its way to London. Speculations in trade have lately increafed this quantity: but there is reafon to fear that the quality is not improved by it, as there is faid to be conftantly a difference between *barter-wine* and *bill-wine*; that is between wine exchanged for marketable articles, and wine which is paid for by bills drawn at a fhort credit. The beft wine grows on the fouth fide of the ifland, and the beft of that for the moft part in the inferior parts, and on that fide of the hill which points to the eaft. This advantage feems entirely attributable to warmth; the weft being always cooled by the breeze or inbah, which by noon conftantly blows from that quarter. The north wine was formerly much undervalued, and principally confumed in the ifland, either as a beverage of the natives, or diftilled into brandy. But the increafed demand for the article has encouraged many of the merchants to mix a portion of north wine with the fouth; and the improvement of its price has given additional encouragement to improving it by cultivation. That the quality of the wine, however, depends principally on the afpect and foil, is pretty clearly proved by the fuperiority of the cercial. This, though originally produced from the Rhenifh grape, is confidered the ftrongeft and richeft of all the dry wines in the ifland. The beft wine is almoft always mixed with a portion of the *vinho tinto*. This is at firft nearly the colour of red port, but from year to year grows paler. Hence, could we always afcertain the genuinenefs of the wine, the colour would be a confiderable means of afcertaining its age. But the addition of the north wine will at any time lower the colour, and to the eye give the appearance of age. Certain it is that the vaft demand of late years has nearly exhaufted the ifland of old wine, fo that thofe who wifh for fuch a luxury, will do well to keep it themfelves. This fhould be done, not in a cold underground cellar, but in the warmeft part of a dwelling-houfe, and, if fuch can be procured, in an apartment open to the fouth.

The quantity of genuine Malmfey produced annually is very fmall, and in truth very uncertain, becaufe a good deal is manufactured with refined fugar, and though greatly inferior to the genuine, is, if well managed, truly delicious. We have reafon to believe thefe are the only fophiftications of Madeira wine. The ftories of the importation from Teneriffe and other places are certainly unfounded ; at leaft fuch is the univerfal anxiety to preferve the credit of the ifland, that no quantity can be imported which would pay for the danger and expence.

The other exports from Madeira are trifling ; they confift principally of chefnuts, walnuts, preferved citrons, and thofe occafional fupplies of frefh provifions for veffels touching at the port, which are purchafed here much dearer than in England. The imports confift of the greateft part of the provifion of the ifland, excepting frefh meat, and even living fheep and oxen are imported with advantage from Barbary, and the Azores, or Weftern iflands. From America they derive principally their wheat, Indian corn, and, in common with other Catholic countries, vaft quantities of falt fifh. From England they receive moft of their wearing apparel, the quantity and value of which increafe rapidly every year.

The crown of Portugal derives its revenue in part from a duty of 20 *per cent.* on the invoice value of all articles imported excepting provifions. But its principal revenue is from the wines. Befides the tythes, the farming of which is difpofed of by auction every year, and which is every year purchafed at a higher rate, a duty is impofed on all the wine as it is exported, and a fort of excife on what is confumed in the ifland. A revenue is alfo derived from the monopoly of fnuff, cards, and foap. The aggregate is enough to pay all the expences of the civil, military, and ecclefiaftical eftablifhments, and to remit confiderable fums to the crown. But there is always much uncertainty in the laft. We have heard it ftated as 5000 and 50,000 ; the latter we fhould conceive muft be neareft the truth, when we reflect that a confiderable part of the merchants' capital confifted at one time in the manner in which the revenue was remitted to Lifbon.

Of all the complicated mercantile queftions, nothing is for the moft part equal to that of the money in Madeira. From their intercourfe with the Englifh Weft Indies, or from fome other caufe, fcarcely any thing is feen but Spanifh filver coins, and by fome unaccountable incidents, thefe have got the name of Portuguefe coins. Thus the peftreen is called two teftoons, and five of them are called a milrea, and though five peftreens are as exactly equal to a dollar as 5*s.* are to a crown, yet the Portuguefe having no coin correfponding to dollars, for a long time the five peftreens were more valuable than the dollar, which laft was hardly confidered current in the ifland. Though this laft abfurdity is now done away, yet it has made no other difference in the names of their currency, excepting that the dollar has now the name of milrea, in common with its reprefentative five peftreens. But the coins in Portugal, whofe names are thus ufurped by the Spanifh pieces, are intrinfically worth nearly 20 *per cent.* more than the latter. Hence, when an ignorant captain fells his cargo for fo many thoufand milreas, he ufually finds his bills produce him about 20 *per cent.* lefs than he calculated upon. The currency and ufe of the dollar are gradually remedying this inconvenience.

The mode of government remittance to Lifbon was by giving Madeira milreas, for which the merchants gave their bills on Lifbon for the fame number of milreas, payable at two years. By thefe means they paid about ten *per cent. per ann.* for the ufe of money for two years, at the expiration of which they often paid their bills as they became due, by iffuing frefh ones. Thefe tranfactions, though very convenient to the government, and ftill more fo to the merchant, have often been productive of ferious injuries, by inducing inconfiderate people to overtrade their capital, and on the leaft fufpicion of their folvency, the crown has feized their whole ; laying, as in England, violent hands on landed property, which has been fold by the government-debtor after the debt was contracted.

Befides the above duties on wine, the Britifh conful and factory receive a certain fum on every pipe exported to any part of the Britifh dominions, for the expences attending their eftablifhment ; for the relief of failors left on the ifland ; and of decayed merchants entitled to fuch a benefit. This fund fhould alfo fupport a clergyman and Proteftant chapel, the erection of which would probably increafe the reputation of the Britifh nation among the natives, and might even fupport itfelf by voluntary contributions.

We have been thus particular in our account of this ifland, becaufe, however inconfiderable in extent, it cannot be confidered fo in importance. Its climate productions, its fituation by its proximity to Europe, and in the courfe to the Eaft or Weft Indies, all render it interefting, but moft of all, the prefent condition of the European continent, and the intereft which England feels in whatever may facilitate her connection with her diftant fettlements. On this account it may not be amifs to add a few words on the advantage which England might derive from fuch a poffeffion, and the confequences to the ifland of fuch a change.

Madeira is already fo much connected with England, and the inhabitants of Funchal are fo much anglicifed, that in many of the Portuguefe fettlements it is humouroufly called *pichena Londres*, or little London. It is not only the quantity of Englifh goods confumed in the ifland that benefits Great Britain, but the quantity exported from hence to the other Portuguefe fettlements. It is difficult to fay whether England or Madeira is moft benefited by this traffic. The only exchange that can be made for every article of luxury is wine, and the neceffity of this commodity induces an increafe of induftry. Should the ifland become altogether Englifh, it is probable that another fource of wealth would be derived from Englifh capital, which, expended in cultivating or improving frefh lands, might prove a profitable, though at firft an uncertain, fpeculation. But whatever might be the confequences to England, the ifland could not but be benefited by all that is expended on its cultivation. This muft however be accomplifhed by the manual labour of the natives, whofe knowledge of their land enables them to turn to good account their induftry, mufcular ftrength, and great patience under meagre fare. But thefe are no longer fufficient without capital, fince the price of labour is fo much increafed, and the parts eafieft cultivated and moft profitable to the labourer, are more generally occupied.

The prefent government is fimilar to that in the mother country,

country, to which all appeals are made, and to which any alteration in the exifting laws are referred for decrees from the prince. It would not be fafe fuddenly to alter this fyftem; but great pains are wanted to purify the fountains of juftice. A people, accuftomed only to obey by mandate, and to protect each other from the oppreffions of government, could not at once fall into a legiflation of which they are themfelves a part. They muft gradually be taught the bleffings of liberty, by the certainty with which their property and perfons are fecured, and by the reftoration of thofe privileges they once enjoyed; but which now exift only in name. Thefe fhould be well underftood and defined, and the utmoft attempted at firft fhould be a careful appointment of enlightened magiftrates, or judges, as they are moftly termed, with a proper augmentation of their falaries, and the fuperintendance of a governor acquainted with the languages, laws, and cuftoms.

From the heavy duties impofed by government, many expences are fupported, which, according to the freedom of our conftitution, are defrayed by the public, and regulated by commiffioners of their own choice. We refer chiefly to the public works, *viz.* the building and repairing of churches, the improvement of the ports, and the conftruction and repair of roads and bridges. Thefe laft are paid only in part by the crown, the male inhabitants being obliged to perform certain labours in their different diftricts. If the work is confiderable, a certain pay is allowed, but not at all adequate to the ufual price of labour.

If the average amount expended on roads and bridges by government were lodged in the hands of commiffioners chofen by the inhabitants; and if, in aid of this, a tax of two guineas *per annum* were laid on every horfe; if the produce of this were added to the former fund, and the commiffioners were authorized, as in England, to borrow money on annuities: by thefe means, the whole ifland might foon be interfected with roads, and united by bridges, fo as to render every part acceffible with eafe. Hence the produce of the country would readily be brought to the towns, and from thence, by water, to different parts of the coafts; the gentry would have greater encouragement to remain a confiderable part of the year at their country eftates; the manfions on which be rendered univerfally convenient and elegant, and this example would foon extend to the wealthier cottagers, and even to the merchants and tradefmen, who would, as in England, be all ambitious of country refidences. That all this may be accomplifhed, we have a ftriking example in the pavilion which M. de Carvalhal has erected for himfelf, at the diftance of about three miles eaft of Funchal. On a fpot, at one time fcarcely acceffible, with only a fingle clump of trees, and almoft without water, he now exhibits large fheets of water, extenfive avenues of flowering fhrubs, roads in every direction, and the profpect of an Englifh *ferme ornée*.

In conftructing roads in Madeira, the firft object fhould, of courfe, be to preferve as level ground as is confiftent with the nature of the country, by winding round the hills. But great care fhould be taken that the afcent is never interrupted: becaufe, by fuch a provifion, whatever is brought from the country can be conveyed without difficulty or labour; the back carriage muft always be laborious, but mules with packs may be kept at different paffes, and hired on the fpot, like fome additional horfes in particularly fteep roads in England.

One moft ferious evil muft be immediately remedied whenever the ifland is allowed to ufe thofe bleffings with which providence has indulged it. We have remarked the advantages derived from the height at which the rivers rife. This not only gives the command of water before alluded to, but furnifhes a power by which mills might be multiplied to any extent, or for any purpofe. At prefent, the privilege of erecting water-mills is confined to a grandee, who never faw the ifland. Hence the mills, excepting near the town, are diftant, nor is there any inducement to multiply them, as all muft refort to them, however inconvenient. Nor is this all, in order to feed the mills near the town, a confiderable quantity of water is loft, which, if expended on the higher grounds, would, in fome feafons, add greatly to their fertility.

Thefe are only a few of the benefits which England as a nation, and Madeira as a fettlement, might mutually confer on each other. Befides this, a port might be conftructed at Funchal, the bay of which, though invariably calm in the fummer, is, during the winter, always uncertain, and fometimes dangerous. But the advantages to the individuals of both nations would be incalculable. The eafy diftance might induce many in delicate health to pafs the winter in Funchal, where the thermometer is rarely lower than 60°, nor above 65°, and often ftationary within doors for twenty-four hours. In the fummer about 10° higher, and the air gradually cooler as you afcend the mountains. This city already, we are informed, has its theatres, its coffee-houfes, and would foon have its library, its printing-preffes, and its own gazettes. Though the expences of the table are perhaps equal to thofe of London, yet wine may be procured without an exorbitant duty; there are few other taxes, and the equipages of London will never be neceffary in fuch a climate, nor perhaps manageable in fuch a country.

If ever the population of Madeira fhould be fo confiderable as to render labour cheap, or that employment fhould be wanted for many fuperfluous hands, the filk worm feems, of all others, the moft promifing article. For fix, often for feven or eight months, they could feed on the trees in the open air without the danger of rain, and the defcription given of the rivers would at any time furnifh ftreamlets which might turn mills fufficient for winding off the web. It is true, the attempts formerly made to introduce the white mulberry have hitherto failed, but this has been rather from a want of general concurrence in the cottagers, than from any difficulty in the foil.

The inhabitants of Madeira were reckoned at the laft cenfus about 100,000; of thefe nearly a tenth part are faid to refide in or near the capital. Funchal has been well fortified fince the Englifh have arrived there, which was eafily done on account of the barriers provided by nature. The regular force of the Portuguefe government was 200 infantry, ill dreffed and ill trained. The fame number of artillery, whofe appearance and difcipline are highly refpectable. There are three regiments of militia commanded by colonels of diftricts. Thefe are dreft in uniform at their own expence. The reft of the inhabitants, from the age of twelve years and upwards, are expected to furnifh themfelves with pikes or guns according to their abilities. In fhort, the whole government may be called military, a ftriking proof how little danger there is putting arms in the hands of citizens who are not oppreffed, for in Madeira affaffinations are few, and thofe few rarely among the lower clafs; and civil commotions have feldom exifted for years paft, and never proved fanguinary.

The other iflands, included under the government of Funchal, are fcarcely inhabited, excepting Porto Santo. This has its own governor, but is amenable to the governor at Funchal. Its produce is fimilar to Madeira, excepting that the wine is inferior. A good deal of barley is grown on this and the fmall iflands, called *defertas*. Porto Santo alfo produces the water-melon in abundance, and much

much fuperior in flavour to thofe which have been attempted in the larger ifland. Its foffilology is faid to be very curious and valuable, but hitherto it has not been fufficiently explored. There is a tradition that it is inhabited by the offspring of degraded fidalgos from the mother country. It is certain that the natives have a different caft of features, being fairer, but by no means handfomer, nor fo well formed. We have never heard their numbers afcertained. The falvages contain lime-ftone, which is not to be met with in the other iflands.

MADEIRA, or *Madera*, a river which rifes in the government of Charcas in Peru, near Cochabamba, in S. lat. 18°, firft called "Conderillo:" having received fome fmaller rivers, it changes its name into "Parapite." Hitherto its courfe is S.E., till it enters a lake fituated in S. lat. 19° 50′, after which it takes a northerly direction, with the name of "St. Miguel," afterwards "Sara;" about S. lat. 14°, it is called "Mamore;" and in S. lat. 10°, it leaves Peru, and enters Brazil, from which time it is called Madeira, till it difcharges itfelf into the river of the Amazons in S. lat. 3° 15′. W. long. 60° 40′. Its whole courfe is about 1200 miles.

MADELA, a town of Afia, in Paleftine; 192 miles S.E. of Jerufalem.

MADELAN, a town of Hindooftan, in the Subah of Agra; 10 miles S.E. of Kerowly.

MADELEY MARKET, a market town and parifh fituated in the hundred of Wenloch, and county of Salop, England. It is finely feated in a winding glen, through which the river Severn flows, at the diftance of 147 miles from London, and $5\frac{1}{2}$ from Shifnal. According to the parliamentary returns in 1801, this town then contained 291 houfes, and 4758 inhabitants, being 2432 males, and 2326 females, of whom 1594 were found to be employed in various branches of trade. A navigable canal to the Ketley iron-works, which are among the moft extenfive in England, and alfo to a work for the extracting of foffil tar or petroleum from the condenfed fmoke of pit-coal, paffes clofe to the houfes. Over the Severn, in this parifh, is thrown a noble bridge of caft iron, which was erected in 1779, and confifts only of a fingle arch, 100 feet 6 inches in fpan, and 40 feet in height at the centre above the level of the bafe line. The road over this bridge is compofed of clay and iron flag, 24 feet wide, and one foot deep. Iron top plates project from each fide, and ferve to fupport a very noble baluftrade of caft metal. The weight of iron, in the whole, is 378 tons 10 cwt. This bridge contributes not a little to enhance the natural beauty of the romantic dale in which it is placed. (See BRIDGE, *Iron*, in vol. v. of this work.) At the foot of this bridge is the market-place, which is nearly two miles diftant from its original fituation. The market, fince its revival in 1763, previous to which period it had been long difcontinued, has been regularly held on Friday, and is, for the moft part, well fupplied with all the articles requifite for the fuftenance of man. This parifh includes the populous hamlets of Colebrook-dale, and Madeley-wood, which are remarkable for their extenfive coal works.

MADENALLY, a town of Hindooftan, in the circar of Sollapour; 36 miles N. of Sollapour.

MADER, a town of Perfia, in the province of Farfiftan; 20 miles N.E. of Eftakar.

MADERAM-PULLI, in *Botany*, a name ufed by fome authors for the tree whofe fruit is the tamarind of the fhops.

MADERNO, CHARLES, in *Biography*, an eminent Italian architect, was born at Biffona, in Lombardy, in the year 1556. He went at a very early age to Rome, where his uncle, Domirico Fontana, was, at that time in full employ as an architect. His genius for fculpture became manifeft, and he was placed with an artift in that branch of the fine arts. His progrefs in modelling was fuch as led his uncle to confide to him the management of fome buildings then in hand, which he executed with fo much fkill, that he was advifed to devote himfelf entirely to architecture. At the death of Sixtus V. Maderno was appointed to defign and execute the magnificent tomb for his interment. The public works which were carried on under Clement VIII. were chiefly committed to the care of this artift, and fo high was his reputation in the fucceeding pontificate, that, on the fucceffion of Paul V. in 1605, he was appointed to finifh the building of St. Peter's; his plans being preferred to thofe of eight competitors, and the work was placed under his direction. He was afterwards employed upon the pontifical palace on the Quirinal mount. Another work, for which he is celebrated, was the raifing a fine fluted column found in the ruins of the temple of Peace, and placing it on a marble pedeftal in the fquare of St. Maria Maggiore. His genius was by no means confined to architecture, he was fent by the pope on a commiffion to examine the ports of the ecclefiaftical ftates, and afterwards furveyed the lake of Perugia, and furrounding country, in order to divert the inundations of the river Chiana. He was confulted upon moft of the great edifices undertaken in his time in France and Spain, as well as in the principal towns of Italy. His laft work of confequence was the Barberini palace of Urban VIII., which he did not live to complete. He died of the ftone in 1629, when he had attained to the age of feventy-three. He had feen ten popes, by moft of whom he had been regarded with favour. Gen. Biog.

MADERNO, in *Geography*, a town of Italy, on the S.W. coaft of lake Garda; four miles N.E. of Salo.

MADETZ, a town of Walachia, on the Danube; 30 miles W.S.W. of Giorgiev.

MAD-HOUSE. By 14 Geo. III. c. 49. enacted to be in force for five years, and by 19 Geo. III. c. 15. which continued it for feven years farther, and by 26 Geo. III. c. 91. made perpetual, no perfon, on pain of 500*l.* fhall entertain or confine, in any houfe kept for the reception of lunatics, more than one lunatic at a time, except fuch lunatics as are committed by the lord chancellor, &c. without a licence to be granted yearly by the college of phyficians, within London and Weftminfter, and feven miles thereof, and within the county of Middlefex, and elfewhere by the juftices in feffions. The licences are to be ftamped with a 5*s.* ftamp: every one who keeps a number of lunatics, not exceeding ten, fhall pay the fum of 10*l.* and above ten the fum of 15*l.* and 6*s.* 8*d.* on every licence, as a fee to the fecretary of the commiffioners. No licence can authorife any perfon to keep more than one houfe. The commiffioners, confifting of two juftices and a phyfician, may vifit licenfed houfes, and infpect their ftate as often as they think fit: on application to the commiffioners for information concerning any confined perfon, the fecretary is to fearch his books, and acquaint the perfons applying with the name of the keeper in whofe houfe the lunatic is confined. The keeper is required to give notice to the fecretary, within fourteen days after receiving a patient, who is to file fuch notice; and every keeper admitting a perfon as lunatic, without an order under the hand of fome phyfician or furgeon that fuch perfon is proper to be received, fhall pay the fum of 100*l.*

No licence fhall be granted unlefs the keeper enter into a recognizance in 100*l.* with two fureties in 50*l.* each, or one

one furety in 100*l.*; on the ufual conditions, for the good behaviour of the keeper. This act doth not extend to any of the public hofpitals. This act contains various diftinct regulations for fuch houfes in London, Weftminfter, and within feven miles of the town, and in the county of Middlefex. By 48 Geo III. c. 96. feveral provifions are made for the better care and maintenance of lunatics, being paupers or criminals in England. The firft feventeen fections, and fome others, relate to the building and endowing of lunatic afylums. As foon as fuch an afylum is ready, juftices are, by warrant, to remove lunatics to it, and the parifh is chargeable with an allowance. If the overfeer neglects to inform the juftices, and to apply for fuch warrant, he fhall forfeit for every offence, not exceeding 10*l.* nor lefs than 40*s.* When lunatics are committed by juftices under the 17 Geo. II. c. 5. the faid juftices fhall order in their warrant that fuch lunatic, or mad perfon, fhall be confined in fuch lunatic afylum, and not elfewhere; but if no lunatic afylum be eftablifhed, they may order that fuch perfon be confined in any houfe duly licenfed under the 14 Geo. III. c. 49. Where the lunatic's legal fettlement cannot be afcertained, the juftices may order fuch perfon to be confined in the lunatic afylum for the county or diftrict within which fuch perfon fhall have been apprehended, if there be any fuch, and not elfewhere; if there be none, in fome houfe dulylicenfed under 14Geo.III. c. 49, or in fome other fecure place, as directed by the 17 Geo. II. c. 5. And if fuch perfon have not an eftate to pay and fatisfy the reafonable charges of removing, and of keeping and maintaining and curing fuch perfon under 17 Geo. II. c. 5. then thofe charges fhall be paid by the treafurer of the county within which fuch perfon fhall be apprehended, out of the county rates, by order of two juftices directed to him for that purpofe. All lunatics, &c. fhall be fafely kept, nor be fuffered to quit the faid afylum, until the vifiting juftices fhall order their difcharge, and fignify the fame in writing under their own hands and feals: and if any fervant or officer in fuch afylum fhall, by neglect or connivance, permit fuch perfon to efcape and to be at large, without fuch order, he fhall, for every fuch offence, forfeit not exceeding 10*l.* nor lefs than 40*s.* In all cafes, where by virtue of the 39 and 40 Geo. III. c. 94. any perfon fhall be kept in cuftody, it fhall be lawful for any two juftices of the county where fuch perfon fhall be fo kept, to afcertain, by the beft legal evidence that can be procured under the circumftances of perfonal legal difability of fuch lunatic, the place of the laft legal fettlement, and the circumftances of fuch perfon; and if fuch perfon is not poffeffed of fufficient property for his maintenance, to make order upon the parifh where they fhall adjudge him to be legally fettled to pay fuch weekly fum for his maintenance in fuch place of cuftody as fuch court or his majefty fhall appoint, as fhall be from time to time directed and fixed upon by one of his majefty's principal fecretaries of ftate; and where fuch place of fettlement cannot be afcertained, fuch allowance fhall be paid by the treafurer of the county where fuch perfon fhall have been apprehended; but if it fhall appear that fuch perfon is poffeffed of fufficient property as aforefaid, then fuch juftices fhall order the fame to be applied to fatisfy the expence and maintenance of fuch perfon in the manner directed by 17 Geo. II. c. 5.

MADIA, in *Botany*, was fo named by Molina, in his Natural Hiftory of Chili. We are unable to conjecture, with precifion, concerning the derivation of this word; it cannot furely be traced from μαδος, *fmooth*, or *without hair*, becaufe one fpecies at leaft, if not the whole genus, is remarkably hairy. Molin. Chil. 113. Willd. Sp. Pl. v. 3. 1951. Cavan. Ic. v. 3. 50. Juff. 450.—Clafs and order, *Syngenefia Polygamia Superflua*. Nat. Ord. *Compofitæ difcoideæ*, Linn. *Corymbiferæ*, Juff.

Gen. Ch. *Common calyx* globofe, of many leaves arranged in a double row, carinated; the eight exterior ones acute, and longer, approximating into a globe. *Cor.* compound, radiated; florets of the difk all perfect, numerous, tubular, five-cleft; thofe of the radius female, eight in number, ligulate, three-toothed. *Stam.* (in the tubular florets) Filaments five, capillary, very fhort; anthers cylindrical. *Pift.* (in the tubular florets) Germen ovate-compreffed, moft acute at the bafe, incurved; ftyle fimple; ftigmas two. *Peric.* none, except the permanent calyx. *Seeds* folitary, the fhape of the germen. *Recept.* naked. *Down* none.

Eff. Ch. Receptacle naked. Down none. Calyx double, the outer one of eight or ten equal leaves, longer than the inner one, which is compofed of many leaves.

1. M. *vifcofa.* Cavan. Ic. t. 298. (M. mellofa; Jacq. Hort. Schoenb. t. 302.)—Leaves feffile, almoft lanceolate, hairy. Flowers axillary.—A native of Chili. It flowered in the Royal Gardens of the Efcurial in Auguft and September 1795.—*Stem* round, fomewhat corymbofe, branched, more than two feet high, covered with glandular hairs. *Leaves* fcattered, feffile, but not embracing the ftem, obtufe at the point, broader at the bafe, fingle-ribbed. *Flowers* yellow, ftrong-fcented, on fhort footftalks, at the fummits of the branches. *Seeds* black and fhining.

2. M. *fativa.* Willd. n. 1.—Leaves linear-lanceolate, on footftalks.—A native of Chili.—*Stem* hollow, erect, round. *Flowers* on ftalks, terminal.

3. M. *mellofa.* Willd. n. 2.—Leaves embracing the ftem, lanceolate, hairy.—A native alfo of Chili. These two fpecies are adopted by Willdenow from Molina without any further defcription than is now given.—Cavanilles alfo mentions them, but merely to fay that *vifcofa* differs from them both in having fhort roots, and feffile leaves, never embracing the ftem.

MADIAN, or MIDIAN, in *Ancient Geography*, a town of Arabia, in the province of Hedsjas, which owes its name to one of the fons of Keturah, and was deftroyed in the time of Abulfeda. It is feated at a fmall diftance from the Red fea, which at this place is not more than 100 paces wide. The Arabs call it "Megar el Schuaid," or the Grotto of Schuaid, or Jethro; and they fuppofe that this is the place where Mofes tended his father-in-law's flocks. Ptolemy calls it *Modiana*. N. lat. 28° 20′. E. long. 38° 10′. See MIDIAN.

MADINGA, in *Geography*, a river of America, in the ifthmus of Darien, which runs into the Spanifh Main, N. lat. 9° 22′. E. long. 78° 48′.

MADISON, a county of Virginia, bounded north-eaft by Culpepper, fouth by Orange, and weft by Shenandoah county; about 30 miles fquare, watered by the Rapid Ann and Robfon rivers, and containing 4886 free inhabitants, and 3436 flaves.—Alfo, a county of Kentucky, adjoining Fayette, Clarke, Lincoln, and Mercer counties. It contains 10.380 inhabitants, of whom 1688 are flaves. The chief town is Milford.—Alfo, a fmall poft-town of Amherft county, Virginia, on the north fide of James's river, oppofite to Lynchburg; 150 miles W. by N. of Richmond.

MADISON'S *Cave*, the largeft and moft celebrated cave in Virginia, fituated on the north fide of the Blue Ridge. The cave extends into the earth about 300 feet, branching into fubordinate caverns, which terminate, after afcents and defcents, in two different places, or bafons of water of unknown

known extent, nearly on a level with the water of the river.

MADISTERIUM, Μαδιστήριον, a name given by the Greeks to an inftrument intended to keep the fkin fmooth, by eradicating the hairs.

MADMAR, in *Geography*, a town of Perfia, in Khorafan; 12 miles W. of Herat.

MADMEN. See LUNATICS.

MADNESS. See MENTAL *Derangement*.

MADNESS *from the Bite of rabid Animals*, the *Rabies canina*, and *Hydrophobia* of medical writers, will be found defcribed at length under the latter title. The term *madnefs*, as applied either to the difeafe in the dog, or other rabid animal, or to that of the human fpecies, when bitten, is an abfolute mifnomer, and has led to fome important popular errors both of opinion and practice, and ought therefore to be difcarded. There is neither the violence in the rabid animal, which the term implies; nor the derangement of intellect, or violence in the hydrophobic patient, which has been inferred from the appellation. Yet thefe miftaken notions have led to the practice of permitting dogs, actually rabid, to go loofe, and inflict mifchief on the public, as well as to that of murdering fick men by fuffocation, from an apprehenfion of the ungovernable fury which it has been fuppofed would enfue. See DOG and HYDROPHOBIA.

MADNETI, in *Geography*, a town of Hindooftan, in Myfore; 18 miles E. of Bangalore.

MADNING-MONEY; old Roman coins, found about Dunftable, are fo called by the country people; and have their name from *magintum*, ufed by the emperor Antoninus in his Itinerary, for Dunftable.

MADODENQUIK, in *Geography*, a river of New Brunfwick, which runs into the St. John, N. lat. 46° 19'. W. long. 67° 34'.

MADOLAND, a town of Kemaoon; 5 miles N.W. of Kerigar.

MADOMGUNGE, a town of Hindooftan, in Bahar; 7 miles S. of Bahar.

MADONA, a fmall ifland in the Mediterranean. N. lat. 36° 31'. E. long. 26° 49'.

MADONA *di Scopia*, a town on the eaft coaft of the ifland of Zante; 2 miles S.E. of Zante.

MADONIA, a mountain of Sicily, in the valley of Mazara; 35 miles S.E. of Palermo.

MADONNINA, in *Commerce*, a filver coin of Genoa, of which there are the double, fingle, and half, at 40, 20, and 10 foldi. The double Madonnina (the fingle and half piece being in proportion) weighs 5 dwt. $19\frac{1}{2}$ gr., contains, in pure filver, 116.2 grains, and its value is 1*s.* $4\frac{1}{4}$*d.* fterling. The impreffion is a whole length figure of the Virgin ftanding, with her head encircled by ftars: legend, SUB TUUM PRÆSIDIUM (under thy protection), with the date; and round the figure, NE DERELINQ. NOS (do not forfake us): reverfe, arms of Genoa; legend, DUX ET GUB. REIP. GENU. (doge and governor of the republic of Genoa).

MADOO, in *Geography*, a fmall ifland in the Eaft Indian fea. S. lat. 7° 31'. E. long. 122° 18'.

MADOOCARRY, or MADOOGARY, a town of Hindooftan, in Coimbetore; 6 miles S.S.W. of Coimbetore.

MADOOR, a river of Hindooftan, which rifes in the Myfore, about 20 miles N.N.W. of Sera, and runs into the Cauvery, 36 miles below Seringapatam.

MADOOSAND, a town of Hindooftan, in Rohilcund.

MADORE, a town of Hindooftan, in Myfore; 8 miles N. of Seringapatam.

MADRAPOUR, a town of Bengal; 20 miles S.E. of Boglipour.

MADRAS, FORT ST. GEORGE, or, as it is called by the natives, *China-patam*, a town of Hindooftan, on the coaft of Coromandel, and clofe on the margin of the fea. It was about the year 1620 that the Englifh Eaft India company obtained leave of the king of Golconda to fettle at Madras-patan, where they were permitted to build the fort called St. George; which place has ever fince been the company's general factory for their trade to all parts eaft of Cape Comorin. (And. Hift. Com. vol. ii. p. 6. folio.) Others fay, that Madras was fettled by the Englifh about the year 1640; and it is alfo faid, that the town was built in the reign of Charles II. by order of the Eaft India company, under the fuperintendance of fir William Langhorne. As he placed it in the midft of a fandy defert, altogether dry, and where there was no water fit for drinking, except what was fetched from the diftance of more than a mile, people were curious to know what reafons could have induced him to make fo bad a choice. His friends pretended that his view was to draw thither all the trade of St. Thomas, which has actually been the confequence; while his enemies imputed it to a defire of continuing in the neighbourhood of a miftrefs he had in that Portuguefe colony. In the rainy feafon, the fea threatens deftruction on one fide, while the river, menacing an inundation, is no lefs terrifying on the other. From April to September the fun's heat is fcorching; and if it were not mitigated by the fea-breezes, the place would not be habitable. In the vicinity of the city the foil is fo dry and fandy, that it does not produce fo much as a blade of grafs fpontaneoufly, nor any corn without great labour of culture. The roots, herbage, and vegetables, confumed in this place, are brought from a confiderable diftance. It is ftill a more unfavourable circumftance, regarding the place in a commercial view, that, in common with all the other European fettlements on this coaft, Madras has no port for fhipping; the coaft forming nearly a ftraight line; and it is alfo incommoded with a high and dangerous furf that breaks upon it, and induces the neceffity of ufing the boats of the country for the purpofe of landing. Thefe are of a fingular conftruction, being formed without ribs or keel, with flat bottoms, and having their planks fewed together; iron being totally excluded throughout the whole fabric. By this conftruction they are rendered flexible enough to elude the effects of the violent fhocks which they receive by the dafhing of the waves, or furf on the beach; and which either overfets or breaks to pieces a boat of European conftruction. No port for large veffels occurs between Trinkamaly and the Ganges, that is, in an extent of 15 degrees; fo that the comparative proximity of the former to Madras and Pondicherry renders it a capital object, both to the Englifh and French. Neverthelefs, Madras has been reckoned among the richeft ports in India. Notwithftanding local difadvantages, the company find it convenient in other refpects, efpecially as to their trade in calicoes, chintzes, and muflins, diamonds, &c., and in putting off their European wares moft fought after there, *viz.* ftockings, haberdafhery, gold and filver lace, looking-glaffes, drinking-glaffes, lead, wines, cyder, cheefe, hats, ftuffs, ribbons, &c.

Madras is divided into the White Town and the Black Town. The firft of thefe, known in Europe by the name of Fort St. George, is inhabited only by the Englifh. The fort lies N.N.E. and S.S.W. in the middle of the White or Englifh Town. It is a regular fquare, about 100 yards on each fide. The White Town is about a quarter of a mile in

length,

length, and half as much in breadth. North of the fort are three ſtraight ſtreets, and on the ſouth an equal number. The houſes are flat-roofed, built with brick, and covered with a plaiſter made of ſea-ſhells, which no rain can penetrate. The walls are thick, and rooms lofty; but few of them exceed one floor, though ſome are raiſed a floor above the ground. Oppoſite to the weſt gate of the fort is a barrack, for lodging the company's ſoldiers when off guard; and adjoining to this, a very convenient hoſpital. At the other end of the barrack is a mint, where the company coin gold and ſilver. There is a town-houſe, where the magiſtrates aſſemble, and in which courts of juſtice are held. The whole is encompaſſed with a ſtrong wall of the ſame ſtone with that uſed for building the fort. This is defended by batteries, baſtions, half-moons, and flankers; the whole being mounted with about 200 pieces of cannon, and three mortars, including the guns on the outworks, beſides field-pieces. Round it, on the weſt ſide, is the river, by which and a battery it is defended. South of the White Town is a little ſuburb, the reſidence of the black watermen, who are its ſole occupants. This conſiſts of little low thatched cottages; and beyond it is an outguard of blacks, to give notice of any danger. Indeed it cannot be well attacked, except on the ſouth and north ſides; for towards the ſea, the ſwell and ſurges are a perfect ſecurity. Madras is now, perhaps, ſays major Rennell, one of the beſt fortreſſes in the poſſeſſion of the Britiſh nation; and although not ſo regular a deſign as Fort William, in Bengal, yet from the greater facility of relieving it by ſea, and the natural advantages of ground, which leave the enemy leſs choice in the manner of conducting his attacks, it may, upon the whole, be deemed at leaſt equal to it.

The Black Town, called *Madras*, and ſometimes *Chinapatam*, was formerly quite open, but, ſince the year 1767, it has been ſurrounded with a ſtrong wall, and a ditch full of water. The wall is of brick, 17 feet thick, with baſtions at proper diſtances. On the weſt is a river, and on the eaſt the ſea; north is a canal cut from the river to the ſea, which anſwers the purpoſe of a moat on that ſide. The town is a mile and a half in circumference, and might be reckoned a ſtrong place, with a garriſon proportioned to it; and attention has lately been given to this circumſtance, ſo that it neither wants men, nor ſtores and proviſions for its ſecurity and defence. This town is inhabited by Gentoos, Mahometans, and Indian Chriſtians, *i. e.* Armenians and Portugueſe, and alſo a number of Jews. The ſtreets of the Black Town are wide, and ſheltered with trees from the ſun's heat. Some of the houſes are of brick; the others are mean cottages. The abbè Raynal reckons the whole number of inhabitants of Madras at 300,000.

The town is in general very populous, each of the cottages containing a family of ſeven, eight, or nine perſons; and yet, numerous as they are, and mean in their appearance, the place abounds with wealth. The bazar or market is every day crowded, and exchanges of property are made to a great amount, which they transfer with as much facility as it is done on the Exchange of London. In the Black Town is an Armenian church, with ſeveral little pagodas or Indian temples, to which belong a number of prieſts and female choriſters. From the beginning of March 1777 to the end of February 1778, the temperature of this coaſt was upon a mean 81°.4; that of the ſtandard is 81°.3; the greateſt heat was 102°, the leaſt 64°. Kirwan. N. lat. 13° 5'. E. long. 80° 25'.

The company's lands, or Jaghire, extend from Madras to the Pallicate lake, northward; and to Alemparvé, ſouthwards; and weſtward, beyond Conjeveram; that is, about 108 Britiſh miles along ſhore, and 47 inland, in the wideſt part. This Jaghire is underſtood to be held in perpetuity. It contains about 2440 ſquare miles, and its revenue is reckoned at about 150,000*l. per annum.* Rennell's Mem.

MADRE DE DIOS, an iſland in the South Pacific ocean, near the coaſt of Patagonia, 180 miles in circumference. S. lat. 51°. W. long. 77° 46'. See alſo RESOLUTION.

MADRE *de Popa*, a town with a convent, in South America, in the province of New Grenada, ſituated on the river Grande, or Magdalena. The pilgrims in South America reſort in great numbers to the convent in this place, regarding it with a veneration ſimilar to that with which Santa Caſa is reſpected in Europe. Many miracles are reported to have been wrought here by the holy virgin, in favour of the Spaniſh fleets and their ſailors, who are therefore very liberal in their donations at her ſhrine; 34 miles E. of Carthagena. N. lat. 10° 51'. W. long. 76° 15'.

MADREBOMBO. See SCHERBRO.

MADREPORA, MADREPORE, in *Natural Hiſtory*, a genus of the claſs Vermes, and order Zoophyta; animal reſembling a meduſa; coral with lamellate ſtar-ſhaped cavities. There are about 120 ſpecies ſcattered through the different ſeas on the globe, ſome of which, as will be noted, are common to our coaſts. Theſe are uſually diſtributed into five ſubdiviſions, as follow:

A. *Compoſed of a ſingle Star.*

Species.

*VERRUCARIA. Star orbicular, flattiſh, ſeſſile, with a convex diſk full of tubular pores and a radiate border. This ſpecies is found in the Red, Mediterranean, and Northern ſeas, adhering to marine vegetables, and the ſofter zoophytes. It is the ſize of a ſplit pea, and appears an intermediate ſpecies between the madrepore, tubipore, and millepore; white or yellowiſh, with aggregate tubes on the diſk, like florets of a compoſite flower, and a flattened ſtriate border, like the rays of theſe flowers.

TURBINATA. This is deſcribed as turbinate, ſeſſile, ſmooth, with an hemiſpherical concave ſtar. It is found in Gothland and Campania.

*PORPITA. Without a ſtem; the ſtar is convex, orbicular, with a depreſſed centre, beneath flat, margined, ſmooth.

FUNGITES. Orbicular, convex, with ſimple longitudinal laminæ or gills, beneath concave and papillous. It is found in the Indian and Red ſeas; ſometimes with and ſometimes without footſtalks; is from one to ſix inches in diameter; white, with a concave centre, and rough beneath; the gills are acute, alternately ſhorter and irregularly ſerrate.

PATELLA. Without ſtem; gills granulate at the ſides, denticulate at the margin, and placed in a triple order; the third reaching from the centre to the margin. Inhabits the Mediterranean, and is about an inch and a half in diameter. All the gills are denticulate at the margin, and very rough at the ſides: the younger ſpecimens are flat, but the full-grown ones convex.

CYATHUS. Clavate, turbinate, with a tapering baſe; ſtar rather conic, with a double, prominent, jagged centre. It inhabits the ſouthern coaſts of Europe; it is about two inches long, and three quarters of an inch in diameter. In ſubſtance it is white and hard; it has about forty gills, with as many intermediate ſmaller ones, the latter reaching to the margin, but not extending to the centre like the larger ones.

B. *With*

B. *With numerous ſeparate Stars, and continued Gills.*

Species.

Pileus. Without ſtem, oblong, convex, beneath concave, with longitudinal rows of concatenate ſtars; gills crowded, abbreviated. This ſpecies inhabits the Indian ocean. In the furrow along the middle is a line of ſtars with their gills diſpoſed on each ſide in a radiate form; under theſe on each ſide are two rows of ſtars, as it were linked together, with their rays nearly parallel and pointing upwards and downwards; margin all round terminated by ſharp erect laminæ, or gills.

Cristata. Foliaceous, creſted, with rows of ſtars impreſſed in the centre; the foliations broad and flattiſh. It inhabits the Indian and South ſeas.

Lactuca. Seſſile, with large, crowded, frondeſcent ſtars, the fronds perpendicular, waved, jagged. This is a rare ſpecies, but is occaſionally found in the American ocean.

Ficoides. This ſpecies is foliaceous, creſted, with ſcattered ſtars; the lateral foliations flattiſh, marginal ones carinate; gills foliaceous. It inhabits the South ſea.

Acerosa. Foliaceous, creſted, with ſcattered ſtars; lateral foliations flat, terminal ones ſubcarinate; gills needle-ſhaped.

Lichen. Foliaceous, creſted, with obconic rounded rows of ſtars, and very acute, carinate, ſubflexuous, obliquely placed foliations. Found in the South ſea.

Agaricites. This is without ſtem; with carinate grooves and concatenate ſtars. Found in the American iſlands; is about five or ſix inches in diameter; cinereous in colour, conſiſting of various divergent ſemiorbicular gills, with numerous ſerpentine grooves, in the bottom of which are placed the ſtars.

Elephantotus. Somewhat turbinate, with granulous parallel gills, and ſcattered prominulent ſtars within. Inhabits the Indian ocean, and is an intermediate ſpecies between the *Lactuca* and *Agaricites*; it reſembles a thin, ſeſſile, undulately curled lamina, with ſtars diſpoſed nearly in the form of a quincunx.

Crustacea. Cruſtaceous, with a flat ſtellate ſurface, compoſed of thick-toothed concatenate rays. Inhabits the American ocean; obtuſely conic, with the ſtars diſpoſed in a quincunx form.

Incrustum. This is unequal, with prominent, conic, truncate, hollow ſtars, which are diſtant at the tip and lamellate within. It inhabits the Red ſea. Stars about the ſize of a pea at the baſe, and half the ſize at the tip.

Exesa. Cruſtaceous, with reticulate, concatenate ſtars, and abrupt, conic, acute interſtices. Inhabits the Pacific ocean. It is white, with conic warts, ſmooth at the tip; gills rough, unequal.

Filograna. This is without ſtem, ſimple, with a very thin, ſerpentine, labyrinthic ſtar, with an acute ſuture, and flat perforated ſpaces. Found in the Indian ocean.

Natans. Simple, without ſtalk; ſtar ſerpentine, labyrinthic, with the diſks of the undulations very broad; ſuture obtuſe, coral porous. Inhabits the Indian and American ſeas.

Anthophyllum. Simple, with an ovate ſtalk; ſtar terminal, hemiſpherical, concave, with radiate thicker gills at the bottom. It inhabits the Mediterranean.

C. *With numerous united Stars.*

Species.

Labyrinthica. Without ſtalk; ſtar with ſerpentine undulations, and obtuſe ſuture. Found in India, and likewiſe in South America; very variable in form, and frequently many feet in diameter. In the Caribbee iſlands it is often burnt into lime; gills denticulate, and jagged at the ends.

Sinuosa. This has ſpreading, ſhort, flexuous undulations, and unequal jagged diſſepiments, the prominent undulations moſtly doubled; gills denticulate. Inhabits South America.

Meandrites. Without ſtalk; ſtar with ſerpentine undulations and acute ſuture. Inhabits South America and the Mediterranean. The undulations are larger and looſer than in the *Labyrinthica*, and the ſubſtance is more ſolid, and nearly ſtony; the centres of the ſtars radiate with thick gills.

Areola. Without ſtalk; the undulations are dilated, and in ſome places doubled, with narrow truncate margin; gills crenate. This is found in India and South America; is of a roſy colour, and ſmooth beneath.

Abdita. Subglomerate, with ſtar-ſhaped, angular, obconic foliations and ſimple undulations; gills narrow, with crenulate teeth. This is thought to be a variety of the *Favoſa*, to be hereafter deſcribed.

Phrygia. With long narrow undulations, and perpendicular prominent ones, the diſſepiments ſimple, lamellate, lobulate; gills rather remote. Found in the Southern ocean. The undulations are ſometimes ſtraight, and ſometimes flexuous.

Repanda. This has prominent undulations thickened; the diſſepiments ſimple and hardly united; gills numerous, moſt of them thickened within.

Ambigua. The undulations of this ſpecies are ſtar-ſhaped and flexuous, the prominent ones are thickened, diſſepiments ſimple and thickiſh; the gills are diſtant.

Dædalea. This has deep, ſhort undulations, and perpendicular prominent ones; the diſſepiments jagged-gills ſerrate. Found in the Eaſt Indian ocean.

Gyrosa. This ſpecies is cellular, with doubled foliaceous, prominent undulations, and ſimple diſſepiments; the gills are foliaceous and equal. This is one of the ſmootheſt of the genera, and covered with numerous cells.

Clivosa. The undulations in this are narrow at the baſe with equal diſſepiments, the prominent ones are ſimple and thickiſh; the gills are alternately abbreviated. It inhabits South America; is rounded and nodulous.

Cerebrum. This is known as the *Brain-ſtone*; it is nearly globular, with very long tortuous undulations, and ending with flattiſh prominent ones. It differs in ſize from two inches to two feet in diameter.

Involuta. The undulations in this are dilated at the baſe, and are ſhort with nearly equal diſſepiments; the prominent ones are ſimple.

Implicata. Undulations rounded, and nearly perpendicular with equal and broad diſſepiments; the prominent ones are doubled and broad.

Cochlea. In this the undulations are ſpiral; the ſtar is ſimple or double, with a punctured centre; the rays are ſerrulate. It inhabits Tranquebar, and is a ſpecies that is between the Teſtacea and the Zoophyta.

D. *Aggregate, undivided, with diſtinct Stars, and porulous, tuberculous, prominent Undulations.*

Species.

Favosa. The ſtars, in this ſpecies, of the fourth diviſion, are angular, concave, connected. It inhabits the Indian ocean. It is white and ſtriate at the ſides; when divided tranſverſely it appears reticulate, with unequal pores and ſpots; gills toothed.

Cavata.

Cavata. This is fubglomerate, with ftar-fhaped, angular undulations, and fimple narrow divifions; the gills are denticulate.

Bulliens. In this the ftars are diftant, round or oblong, unequal and elevated at the margin, the interftices are formed with fomewhat concave, radiate wrinkles.

Ananas. With annular convex ftars, which are concave on the difk. It inhabits the Mediterranean and South American feas, and is frequently found in a foffile ftate. It is gibbous, and when diffected tranfverfely, refembling a white net with hexangular fpots, including a white ring, and ftriate between the net and the ring.

Hyades. With crowded, obconic, rounded, and fomewhat angular ftars, and thick porous divifions; the centres are flattifh and convex.

Siderea. With crowded, rounded, and angular ftars, and thick, rather convex, divifions; alternate gills nearly united at the margin; centres fimple.

Galaxea. This has rather crowded impreffed ftars, and thick, flattifh, nearly diftinct divifions; the gills are very thin, and the centres a little worn. The gills are formed by fours, reaching to the centre; the three intermediate ones are connivent at the bafe.

Pleiades. The ftars are roundifh with acute, elevated margins; the interftices are concave, fmoothifh, and in fome parts a little cavernous.

Papillosa. This is fomewhat aggregate; the ftars are cylindraceo-papillous, with thickened, rounded, oblique margins. It refembles the *Muricata*, of which it may probably be the embryo, but the papillæ are contiguous, and difpofed in a fingle row.

Radiata. Stars cylindraceous, with elevated margins, the interftices broad, concave, and radiate with grooves.

Latebrosa. Stars roundifh, with many rays and elevated margins; the interftices are radiate with grooves, a little narrowed and unequal. It is found in the Weft India iflands.

Polygona. With minute crowded ftars, intermixed with larger perforated ones, the bottom concave, cylindrical. It inhabits the Indian fea, and refembles a white cruft about two inches thick; the fmaller ftars are minute, rather obtufe, and twelve-rayed, the larger ones as big as the end of a finger, more gibbous, with an empty cavity between them.

Arenosa. This, which has contiguous, flattifh, ochraceous ftars, is found in Algira; is white, with large ftars, fometimes a little elevated and verrucofe.

Interstincta. With round, diftant, immerfed cylindraceous ftars; the interftices are porous. It inhabits India, America, and Norway.

Spongiosa. This is fomewhat dilated, with craggy foliations, obtufe above and flat beneath; the ftars are funnel-formed, deep, and unequal.

Foliosa. This is likewife dilated, with foliations fomewhat craggy and verrucofe above, beneath flattifh; ftars unequal and fmall. It is found in the Indian ocean. It is large and rofy.

Porcelata. The ftars of this fpecies are obconic, with acute margins, and in fome places remote; the interftices are fmooth, and the gills every where granulous. It is very rare, and is of a greyifh-white.

Stellulata. With round, diftant, equal cylinders of ftars elevated at the margins; the interftices are rather flat and rough.

Astroites. This is fub-globular, with very numerous immerfed ftars, the interftices are porous. It inhabits South America, in large maffes, and is whitifh.

Stellata. Solid, rough outwardly, with fcattered convex ftars impreffed in the middle; it inhabits the Indian ocean, is grey with rough minute points.

Nodulosa. This has crowded obconic ftars; the interftices and gills are rather fharp and roughifh; the coral is a little nodulous.

Acropora. Hemifpherical, with crowded, annular, prominent, crenate ftars, which are fmall, elevated with a deeper centre.

Cavernosa. The ftars in this fpecies are immerfed, falver-fhaped with a ftriate border, and feparated by an elevated future; it is found in South America and the Mediterranean; the ftars are elevated, and the future forms a pentagonal net-work.

Punctata. This has crowded ftar-like points compofed of ten dots; inhabits the European ocean, and alfo the Mediterranean; it is rounded, white, friable, with fmall unequal ftar-like dots.

Calycularis. In this the cylinders are united; the ftars are concave, with a rather prominent centre; it inhabits the Mediterranean; is roundifh and brown, with diftinct lateral cylinders, tranfverfely wrinkled outwardly; the inhabitant is an actinia, and is a large and very fluggifh animal.

Truncata. Joints turbinate, proliferous, coalefcing at the extreme margin; ftars truncate, with a concave cylindrical difk. It is found in a foffile ftate; a little rugged, with joints of equal length and breadth.

Stellaris. Joints proliferous, central, folitary; ftars connected by a dilated margin; found foffile on the fhores of Gothland; ftems fimple, parallel, erect, as thick as a finger, and four or five inches long; bark obfoletely ftriate, with cup-fhaped joints an inch long.

Organum. Corals cylindrical, fmooth, diftant, combined, with deflected membranes. It inhabits the Red fea, but is more frequently foffile; the cylinders are parallel, and as thick as an oat-ftraw.

Divergens. Sub-globular, with divergent cylinders ftanding out beyond the furface twice their diameter; this is alfo found in a foffile ftate.

* Musicalis. Corals cylindrical, ftriate, diftant, united by numerous tranfverfe diffepiments; it inhabits the Indian ocean, and is fometimes caft on the Irifh coafts, and often found petrified; coral white, and often very large.

Denticulata. Stars unequal, the gills have an elevated margin, the larger ones acute with a procefs at the bafe; the interftices are grooved.

Faveolata. The ftars of this fpecies are fomewhat angular, many-rayed, and here and there doubled when cut longitudinally.

Retepora. The ftars are rather angular with filamentous gills, and reticulate when cut longitudinally.

Rotulosa. Stars cylindraceous, with few rays; the gills erect and acute towards the margin, with an erect fpine at the bafe.

Cespitosa. Corals round, flightly branched, ftriate, approximate, with turbinate concave reticulate ftars; the coral is white, ftony, very large, and often foft; it is frequently found in a foffile ftate.

Flexuosa. Corals cylindrical, rough, flexuous, approximate, with concave ftriate ftars. Found caft on the fhores of the Baltic.

Fascicularis. The corals are ftraight, cylindrical, glabrous, and divergent. It is found in the Indian ocean; white, ftony, folid, unequal; frequently found foffile in different parts of Europe.

Pectinata. The ftars of this fpecies are orbicular, with a tumid, dilated, radiate margin, the interftices are dotted.

dotted. It is found in Silesia; the stars are flat, with about 30 unequal denticulate gills.

ROTULARIS. The coral of this species is of many shapes, with solitary, orbicular, flat, unequally radiate stars, with a smooth, flat, and hardly prominent margin. This is found in the Red sea, frequently growing to other marine substances, white, solid, sub-globular, or flattened, the stars about a line in diameter.

TUBULARIS. In this the tubes are cylindrical, very entire, a little prominent and expanded into an unequally radiate star. This is frequently found fossile; the tubes are about the size of a crow-quill; the stars have six thicker gills, between each of which are three lesser ones.

MAMILLARIS. Stars orbicular, prominent, wart-like, excavated. Found near Frankfort in a fossile state; the stars are without a border.

PATELLOIDES. Glabrous, stars large and many-rayed, being a little elevated with a minute centre. This is found fossile; the stars have from 30 to 40 thick equal rays.

GLOBULARIS. Stars large, rounded, equally rayed, with a large perforated centre.

FILUM. The stars in this species are rounded, large and somewhat crowded, with a very minute and partly excavated centre. This is found in a fossile state near Basle.

PERFORATA. Stars crowded, minute, excavated, with perforated gills. The coral is sometimes hemispherical, and nearly a foot in diameter; the stars are twelve-rayed.

VERMICULARIS. Stars with unequal, undulate, smooth rays; it is found fossile; the stars have about eight principal rays, some of them are forked.

*ARACHNOIDES. Stars crowded, minute, flattened, with subundulate, short, equal rays. It is found fossile; coral hemispherical; the stars have twelve contingent rays.

UNDULATA. Stars large, elevated, with elongated curved rays; found fossile; stars about half an inch wide, with 24 rays.

SOLIDA. Stars every where contiguous, with united membranaceous margins. It inhabits the Red sea, where it forms vast rocks, and is used in building, and burnt into lime; the stars are concave, with a very thin brittle margin; the centre is orbicular and rough, with a row of small tubercles.

* MONILE. Stars funnel-formed, without disk, covered with gills and divisions; gills equal, radiant, denticulate, and continued into the next star. Found in a fossile state in Arabia; stars as large as a pea; the centre less than a mustard-seed.

DÆDALICA. The stars of this species are somewhat hexagonal, with united reticulate divisions toothed internally, and at the margin. Inhabits the Red sea; the stars are snowy, very thin, and toothed within.

MONOSTRIATA. Divisions between the old stars elevated into rough lanceolate tongue-shaped processes; this is found in the Red sea; is spongy, tough, snowy.

CONTIGNATIO. This is flattish and orbicular, with linear stars at the circumference tending to the centre, the middle ones ovate, divaricate, and nearly contiguous. An inhabitant of the Red sea; is sometimes found a foot in diameter.

CRISTATA. Corals ventricose-conic, smooth, but rough towards the tip; stars angular-rounded, labyrinthic, and furnished with alternately shorter rows of gills. Is found on the shores of China.

RUS. Unequal, with spongy papillæ, and superficial flattish distant stars. It inhabits the Red sea.

CUSPIDATA. Corals conic, grooved; stars turbinate, with straight, elongated, acute gills. It is found in China.

E. *Branched, with distinct Stars and tuberculous porulous Undulations.*

Species.

PORITES. Slightly branched, composite, rough, with substellate crowded pores. Inhabits India and South America; is of a clear white, outwardly often grey; the branches are patulous, obtuse, and rough, with eminent dots.

DIGITATA. Branches clavate, flattened; stars scattered, six-rayed, with a projecting, vaulting, upper margin. Inhabits the Indian ocean; resembles the last; the coral is white, outwardly yellowish-grey.

DAMICORNIS. This species is very much branched; the branches are tapering and subdivided; stars crowded, blind, and ciliate. It inhabits Africa and India.

VERRUCOSA. This also is very much branched, and the branches are obtuse, and furnished with numerous simpler wart-like sub-divisions; the stars are scattered, and also crowded and ciliate.

MURICATA. This is a composite and sub-imbricate species, with obliquely truncate prominent ascending stars; there are six varieties of this species, *viz.* 1. With long pointed branches, and without smaller sub-divisions. 2. With divaricate branches, and short divergent pointed subdivisions. 3. With ascending straight branches and subdivisions. 4. With decumbent lower branches, and ascending, short, acute sub-divisions. 5. In this variety the branches are united into a palm at the base, with divergent sub-divisions. 6. This has numerous divergent branches and sub-divisions; the cylinders of stars are turbinate, with thickend rounded margins. Inhabits India and South America.

FASTIGIATA. In this the stars are decorticated outwardly. Inhabits South America; is white and nearly a foot high.

RAMEA. The branches are striate, cylindrical, truncate, with terminal stars; it is found in the Indian, Mediterranean, and Atlantic seas, is about two feet high; stony, ferruginous, and marked with fine longitudinal striæ, some of which are undulate.

OCULATA. This is tubular, glabrous, flexuous, obliquely striate, with alternate branches and concave stars pointing two ways. Inhabits the Indian ocean, and is found in European countries in a fossile state; the coral is white, perforated within.

VIRGINEA. This is sub-dichotomous, straight, solid, with alternate eminent stars. It inhabits the Mediterranean, American, and Norway seas; it is milk-white, and about the thickness of one's finger.

ROSEA. This species is, according to its name, of a rose colour, much branching, with numerous prominent margined stars; it inhabits the Indian ocean, and is about four inches high; the coral is of a beautiful rose-colour when recent, and afterwards fading to a paler tinge; the branches taper towards the base.

HIRTELLA. Stars every where alternate, prominent, with exserted acute gills. It inhabits the Indian ocean, and is white.

LIMITATA. Branches a little flattened, with scattered six-rayed stars, equal at the margin.

BOTRYOIDES. With thick, fastigiate, obtuse, clustered branches, and reticulate craggy undulations.

GRANOSA. This species is a little branching, crested, and somewhat fingered; with the branches obtuse; all the undulations are acutely carinate; the stars are linear and irregular.

PROLIFERA.

PROLIFERA. This is ſub-dichotomous, coaleſcing, with ſtars at the ſide proliferous, terminal, concave. This is an inhabitant of the Norway ſea; it is white and very ſolid; the ſtars are funnel-formed with about eight gills.

SERIATA. This ſpecies is branching, with ſubulate ſubdiviſions and ſtar-like pores in longitudinal rows. Inhabits the Eaſtern ocean; it is white, ſtony, about the ſize of a large quill, and nearly a foot high.

CACTUS. This has compreſſed, divergent, dichotomous branches, carinate at the edge; the ſides with contiguous ſtars. It is found foſſile in Arabia; is about a foot high; the branches are a little erect, and in tranſverſe rows.

CORYMBOSA. The branches of the corymb are thicker at the tip and marked with prickly ſtriæ; the ſtars are terminal, and ſolitary; the branches are as thick as a finger; the ſtars are an inch wide.

GEMMASCENS. This ſpecies has prominent, obconic, bud-like ſtars. It inhabits the Indian ocean, and is ſnow-white.

PROBLEMATICA. With oblique, minute, immerſed, diſtant ſtars, and broad punctured margin. Is found about the Antilles iſlands; it is ſtony, rough, ſea-green, ſometimes as thick as a man's arm, and full five feet high; the interſtices of the ſtars are marked with lines.

SPURIA. This is ſlightly branched and dichotomous, with cylindrical tubes filled with ſmall, irregularly diſpoſed, longitudinal diviſions.

INFUNDIBULIFORMIS. This is turbinate, ſtriate, funnel-formed, with ſlightly prominent ſtars within. It inhabits the Indian ocean; and is white and ſolid.

ANGULOSA. Dichotomous, faſtigiate, with terminal, turbinate, angular ſtars, and toothed gills. It inhabits the American ſeas; is ſhort, thick, cellular, ſmooth, and white.

DISCOIDES. This ſpecies is diſk-ſhaped, ſomewhat pedunculate, and roughiſh, with marginal faſciculate ſtars. It is found in the Indian ocean.

CHALCIDICUM. This is known by its prominent, remote, cylindrical tubes of ſtars, lamellate without and within. It is found in the Red ſea.

CONCAMERATA. This is flat, with remote ſtars, a little prominent at the margin; the interſtices are lamellate. It is found in a foſſile ſtate.

ROSACEA. Furniſhed with a ſtem, and branched; the leſſer branches are cylindrical, aſcending; ſtars terminal; it is ſometimes roſy, ſometimes white, and ſometimes grey.

We ſhall conclude this article with ſome general obſervations, taken chiefly from the 47th volume of the Philoſophical Tranſactions. In ſpeaking of the animal that fills the cavities of the madrepore, it is ſaid its feet are numerous, and terminate externally in two conical productions, which, being placed on each ſide of every one of the lamellæ that give the ſtellular form to the cavity of the coral, ſerve to affix the animal to the circumference of its cell, and may, with propriety, be conſidered as the inſtruments by which the little animal forms the lamellæ themſelves. The baſes of theſe conical productions unite and form round bodies, which poſſeſs ſomewhat of the figure, and of the properties of muſcles; they ſerving to lengthen or to ſhorten the feet, and alſo moſt probably to regulate the force with which they claſp the lamellæ, on which they exert their plaſtic powers. The other ends of theſe round bodies terminate in ſmall cylindric tubes, which are attached to the ſhell of the animal, in the centre of which is ſeen its head, capable of moving with great quickneſs, and ornamented with ſeveral rays, which are moſt probably the arms or claws with which it ſeizes and ſecures the animalcules on which it feeds. Admitting that the formation of theſe corals is the work of the madreporean polype, it may be thus traced through its wonderful labours. It is found that each of the legs of the polype is provided with two proceſſes, which are applied to each ſide of one of the perpendicular laminæ, while a muſcular pyriform body, attached to the other end of the leg, gives to it the power of employing that motion which is neceſſary for the accompliſhment of its taſk. The young polype may be conſidered as completing its operation by two diſtinct proceſſes; the ſecretion and ſeparation of carbonate of lime from ſea-water conveyed through the pyriform body; and its diſpoſition, at the moment of ſecretion, by the two ſmall proceſſes, where the economy of the animal directs. Proportioned to the number of legs poſſeſſed by the infant animal, is probably the number of perpendicular laminæ, or pillars, converging in the centre, which it begins to erect; theſe, when raiſed to a certain height, appear to be connected together by a horizontal plate of the ſame ſubſtance; on theſe the animal erects ſimilar pillars, and places on them a covering, ſimilar to that with which he has completed the firſt compartment. Thus ſeem to proceed the labours of this minute artiſt; and as the number of its legs or inſtruments increaſe, and as they extend in length, ſo much the number of the perpendicular laminæ, and the circumference of the horizontal plates, augment.

MADREPORE STONE; *Madrepor ſtein*, Moll. Karſten; *Chaux carbonatée madréporite*, Brongn.

This rare ſubſtance, which was diſcovered by baron Moll in the valley of Rufsbach, in the territory of Saltzburg, is conſidered by ſome mineralogiſts as a variety of lime-ſtone, while Klaproth and others conſider it as a diſtinct ſpecies of the calcareous genus.

Externally, and on its longitudinal fracture, its colour is greyiſh-black; on the croſs-fracture, it is of a pitchy black colour.

Has been found hitherto only in maſſive, blunt-cornered, rounded, and oblong, ſometimes flattened pieces, of from three inches to one foot in diameter.

Its ſurface is more or leſs finely furrowed, and ſometimes ſmall ſhallow holes are ſeen in it; furrows often radiating, and marked with tranſverſe minute ſtriæ.

Externally this ſubſtance is glimmering, paſſing into dull; internally, on the longitudinal fracture, partly glimmering, partly gliſtening; but on the tranſverſal planes of fracture it ſhews a pitchy luſtre, ſometimes approaching to metallic. It gives a grey ſtreak.

It is not particularly hard; it is brittle, and eaſily frangible. Fragments opaque, indeterminately angular, not very ſharp-edged, always of a ſtraight or divergingly columnar ſtructure. They often contain copper pyrites, finely diſſeminated, and in pellicles.

It is not particularly heavy; leſs ſo than compact lime-ſtone.

Before the blowpipe, the black colour of the madrepore ſtone is converted into greyiſh-white.

According to the analyſis of Meſſrs. Schrol and Heim, the conſtituent parts of this ſubſtance are, lime $63\frac{4}{16}$, alumine $10\frac{2}{16}$, ſilex $12\frac{5}{16}$, iron $15\frac{15}{16}$; and the ſame conſtituents, and their proportion, are quoted in the French ſyſtems of mineralogy, as the reſults of an analyſis of madreporite made in the *Ecole des Mines*. But Klaproth, who analyſed a ſpecimen ſent by baron Moll himſelf, obtained the following reſults:

Carbonate

Carbonate of lime	93.
Carbonate of magnefia	0.50
Carbonate of iron	1.25
Carbon (radical)	0.50
Arenaceous filex	4.50
Oxyd of manganefe, a trace	
	99.75

Klapr. Beytr. iii. p. 276.

The ftructure of the feparate pieces of this mineral, refembling the aggregation of madrepores, has given rife to its name. Some mineralogifts have, indeed, fuppofed that the fubftance derives its origin from a fpecies of madrepores; but Klaproth obferves, that this opinion is not fupported by any certain mark indicative of preceding organic ftructure.

Patrin confiders the madrepore ftone as a fafcicular variety of arragonite.

The geognoftic fituation of this mineral is not known.

MADRET, in *Geography*, a town of Arabia, in the province of Yemen; 10 miles N.E. of Chamir.

MADRID, a city of Spain, in the province of New Caftile, and capital of the kingdom; feated on the river Manzanares. The accefs to its feveral gates is by ftreets and avenues, planted with trees; of thefe, the gate of Alcala is the moft grand, being conftructed in the form of a triumphal arch, and the entrance to the city by this gate is the moft interefting. As foon as you pafs this gate, you are prefented with an avenue, having on one fide a row of low but uniform houfes, and on the other railings, through which are feen extenfive gardens; the end of it is croffed by the promenade of the Prado; and the view terminates in the extended ftreet of Alcala. The origin of this city is not fatisfactorily afcertained. Some pretend that it was founded by the Greeks, who never penetrated fo far into Spain: others fay that it was the ancient Mantua Carpetanorum. It was at firft known, however, by the palace, or pleafure-houfe, poffeffed here by the kings of Caftile; and the foundation of the town is faid to have been laid by Alphonfo, the 6th of Leon and 1ft of Caftile, who reigned at the end of the 11th century. We find that it was facked by the Moors in 1169, and that it was overthrown by an earthquake towards the middle of the 14th century, under the reign of Peter the Cruel, and rebuilt by Henry II., the fucceffor of that prince. Charles I. felected it for the place of his refidence, which occafioned its increafe from fmall beginnings, and his fon, Philip II., transferred the feat of government to it in 1563. Its firft limits were very narrow, and not extended beyond the vicinity of the king's palace; but in procefs of time it was enlarged by the addition of feveral fuburbs.

Madrid is fituated on feveral low hills near each other, in the midft of an extenfive plain, bounded, on the fide of old Caftile, by the mountains of Guadariama, and undefined by any fixed boundaries on any other fide. The plain is dry, parched up, and naked, without trees, and uneven; and the city is fituated at a confiderable height above the level of the fea. Its fituation for the government of the kingdom is convenient, as it lies in the centre of the kingdom, and equally within reach of the diftant provinces. Its prefent extent is 41,333 feet, or two leagues in circumference; its figure is a fquare; and it has 15 gates of granite, 506 ftreets, 42 fquares, large and fmall, 7398 houfes, 133 churches, convents, colleges, feminaries, or hofpitals, 65 public edifices, 17 fountains, and feveral promenades. It is divided into eight diftricts, each diftrict into eight wards, to each of which an alcade is attached, a fort of commiffary of police, chofen annually from among the inhabitants. The population, according to the account of 1788, amounted to 156,272 perfons; and if the garrifon be included, which confifts of from 8 to 10,000 foreigners, and Spaniards from the provinces, the population may be reckoned at 200,000. Townfend reckons 13 parifhes, 7398 houfes, 32,745 families, amounting to a population of 147,543. The number of deaths in 1788 was 5915, and that of the births 4897. In 1797, the deaths were reckoned to be 4441, and the births 4911. The Plaza Mayor, which is near the centre of the city, and from which feveral ftreets branch out, is the moft populous and beft frequented place in Madrid, the centre of commerce, and particularly of retail trade. It is likewife the place where public fêtes are given, and at that time acquires, from its decorations, illuminations, and crowds of fpectators, a grand appearance. Madrid is well laid out; and though it has many narrow and crooked ftreets, the greater number are handfome, and there are fome which would do honour to the fineft cities in Europe. That of Alcala is the moft diftinguifhed, as it extends in a ftraight line from the Prado to the Puerta del Pol, and is broad enough to admit ten carriages abreaft; but the houfes are not lofty in proportion to the breadth of the ftreet. The ftreets, though roughly paved, are kept very clean, and well lighted by lamps placed on both fides over the houfes, oppofite to each other, at equal and fhort diftances. Many of the private edifices, efpecially in the large ftreets, though difplaying no magnificence of architecture, exhibit an agreeable appearance. The interior of the houfes of perfons of fuperior rank is handfomely and magnificently furnifhed; fome of them being adorned with chef-d'œuvres of the fine arts.

The city of Madrid is in the diocefe of Toledo; and the fpiritual adminiftration is directed by the grand vicar of that city; a bifhop *in partibus infidelium*, auxiliary to the archbifhop, alfo refides there, with the powers of that prelate. In Madrid they reckon 15, or, as Townfend fays, 13 parifhes and fix chapels of eafe; and a number of monafteries, convents, &c. which it is needlefs for us to fpecify. The fecular clergy are 395 in number; and the regular clergy, including thofe of the monks and nuns, amount to 2718; amounting in the whole to 3113. The eftablifhments, under the name of hofpitals, and benevolent affociations for the relief of indigence and diftrefs in this city, are very numerous. The head of the civil adminiftration of Madrid is a military governor, who bears the honours of captain-general of a province; and the police is under the fuperintendance of different magiftrates. Since the expulfion of the Jefuits, Charles III., in 1770, eftablifhed an enlarged plan for the inftruction of youth, the execution of which is committed to a number of fecular priefts, who, in one of the houfes formerly occupied by the Jefuits, fuperintend the college of St. Ifidore. This eftablifhment includes fixteen mafters, or profeffors, for the languages and fciences, and a good library. There is another college appropriated to the inftruction of the young nobility. The academies are numerous: amongft thefe we may reckon four for jurifprudence, and another for medicine; a Spanifh academy, founded in 1714, by Philip V., for the improvement of the Spanifh language; an academy for hiftory, inftituted in 1735, by the fame prince, for the elucidation of hiftorical fubjects, in connection with geography and chronology: the academy St. Fernando, devoted to painting, fculpture, and architecture, which originated in the munificence of Philip V. Among the libraries, we may enumerate the royal library, formed in 1712, and containing a great number of printed volumes, a large collection of MSS., a variety of modern medals, and a selection of antiques: the cabinet of natural history was formed by Charles III., and is receiving continual accessions. To the class of curious and useful edifices in Madrid, we may refer several of its churches, its gates, the custom-house, erected in 1769, the house of the academy of St. Fernando, and of the cabinet of natural history, the Casa de Carreos, or post-house, the Caract de Corse, or state-prison, erected under Philip IV., the Casa del Ayuntamiento, or town-house, the Palacio de los Consajos, or council-house, which is the seat of a supreme tribunal, the Armeria Real, or royal magazine, and the king's palace. The latter stands on an eminence at one of the extremities of Madrid, commanding a distant view of the beautiful country, which is watered by the Manzanares: founded by Alphon. VI. in the 11th century, sacked by the Moors in 1109; afterwards destroyed by an earthquake, but repaired by Henry II. and completed by Henry IV.; much enlarged by Charles V., and his successors; totally consumed by fire in 1734; and, in 1737, rebuilt on its present plan by Philip V. and Ferdinand VI. This new palace presents four fronts, 470 feet in length, and 100 in height, enriched with numerous pillars and pilasters. The interior of this palace is ornamented by several productions of the arts. Its walls and cielings are covered with allegorical paintings by the best masters; and the apartments are filled with pictures by the most eminent artists, among which we may select an Adoration of the Magi by Rubens, and a Bearing of the Cross by Raphael. Among the paintings we may also select a piece by Titian, of Venus binding the Eyes of Cupid, an Apotheosis of Hercules by Mengs, and an Adoration of the Shepherds by the same master. There is also a group of nymphs dancing round the statue of Priapus by Poussin. One of the most magnificent apartments in the palace is the king's hall, in which his majesty gives public audience to foreign ambassadors; it is a double cube of 90 feet, hung with crimson velvet, and adorned with a sumptuous canopy and painted cieling; it is embellished with mirrors of an extraordinary size, with several antique heads, and a small equestrian statue of Philip II., in gilded bronze. The palace is the depository of the crown jewels and regalia; among which we may mention a superb throne, with its canopy, constructed for Philip II. The Buen-Retiro is another royal mansion, situated in another extremity of Madrid, opening on the promenade of the Prado, and extending to the country that borders on the road from Alcala to Madrid; erected by Philip IV. This palace is environed by beautiful gardens, which occupy an immense area, in one of which is placed an equestrian statue of Philip II. in bronze. Madrid has several promenades, but their distance renders them inconvenient of access. Of these the Prado is that which is most frequented.

Madrid does not possess one manufacture, from which it can derive any advantage. It has, indeed, three for hats, and another for stained paper, but they are barely sufficient to answer the demands of the capital. There are also three others of greater note, for inlaid work in stone, for tapestry, and for porcelain; but as they are appropriated to the king, they are wholly unproductive to commerce. A considerable manufacture of salt-petre was also established in 1779, and in 1785 it occupied 4000 men, the number of which has since been increasing. Madrid is so destitute of commerce, that it is absolutely dependent for support on remote provinces or foreign countries for every article of use or ornament, for clothes and corn, for all the luxuries and necessaries of life. This city has no discriminating character with regard to manners or customs. Its amusements are numerous; but that which most interests the inhabitants is the bull-fight. In Madrid are three theatres, which scarcely receive from those who attend them sufficient encouragement for their support. On Corpus Christi day there is a grand procession, composed of the secular and regular clergy of Madrid, followed by the king, his ministers and court, each bearing in his hand a wax taper. As to the climate of Madrid, we observe that the sky is almost always serene and free from clouds; the air is dry, pure, and bracing, especially in the winter season, but it is highly injurious to hectic subjects. The air is so piercing, as to give rise to the proverb, that the air of Madrid destroys a man, when it does not extinguish a candle. The winds most prevalent are, the north in winter, the south and west in spring. In summer the heat is intense, and during the months of July and August almost insupportable. The usual heat in summer is said to be from 75° to 85°; at night the thermometer seldom falls below 70°; the mean height of the barometer is 27°.96. It seems to be about 1900 feet above the level of the sea. Upon the whole, Madrid may be considered as a healthy residence. The various articles of food consumed in this capital are supplied by different parts of Spain. Its bread is excellent, and its water is pure and good. For the supply of the capital, schemes have been adopted for rendering the small stream of Manzanares the channel of communication with the provinces. With this view it has been proposed to form a junction between the Manzanares and the Xarama; and at length under the auspices of Charles III. a canal was formed from the bridge of Toledo near Madrid to the Xarama, near the village of Manzanares, which includes a distance of four leagues. N. lat. 40° 25′ 18″. W. long. 3° 12′. Laborde's View of Spain, vol. iii. Townsend's Travels in Spain, vols. i. and ii.

Madrid, a town of America, in the northern part of Louisiana, seated on the W. bank of the Mississippi, settled some years ago by Col. Morgan, of New Jersey, under the patronage of the Spanish king, and called by the name of the capital of his European dominions. The spot on which it was proposed by the settlers to found a great city, is situated in N. lat. 36° 30′, and 45 miles below the mouth of the Ohio river. Its limits were proposed to extend four miles S. and two W. from the river, so as to cross a beautiful deep lake of clear spring water, called St. Anne's, 100 yards wide, and several miles in length, emptying itself by a constant and rapid narrow stream through the centre of the city. On each side of this lake it was proposed to lay out streets, 100 feet wide, and to continue a road round it of the same breadth. A street, 120 feet wide, was to be formed on the bank of the Mississippi; 12 acres of land were to be preserved in the central part of the city, to be laid out and ornamented for public walks; and other lots of land were destined for other public uses. For the completion of this plan, the country round this spot presents several inducements. It is singularly fertile and productive. The natural growth consists of mulberry, locust, sassafras, walnut, hickory, oak, ash, logwood, &c. besides grape vines in great abundance. The meadows are fertile in grass, flowering plants, strawberries, and with culture produce good crops of wheat, barley, Indian corn, flax, hemp, and tobacco, and are easily tilled. The climate is favourable to health, and to the production of various kinds of fruits and vegetables. Iron and lead mines and salt springs are plentiful; and the banks of the Mississippi, for many leagues, commencing about 20 miles above the mouth of the Ohio, are a continued chain of lime-stone. A fine tract of high, rich, level land S.W., W., and N.W. of New Madrid, about 25 miles wide, extends quite to the river St. Francis. The situation of New Madrid is excellently ly adapted to its being rendered the great emporium of the weftern country.

MADRIDEJOS, a town of Spain, in New Caftile; 30 miles S.E. of Toledo.

MADRIER, in the *Military Art*, a thick plank, about 18 inches fquare, ftrengthened on one fide with a ftrong band of iron, and a ftrong iron hook, and having, on the other fide, a cavity fufficient to receive the mouth of a petard when charged; with which it is applied againft a gate, or other body defigned to be broken down. See PETARD.

MADRIER alfo denotes a long and broad plank, ufed for fupporting the earth in mining, carrying on faps, making caponiers, galleries, and the like.

There are alfo madriers lined with tin, and covered with earth; ferving as defences againft artificial fires, in lodgments, &c. where there is need of being covered over head.

MADRIGAL, in the modern Italian, Spanifh, and French poetry, denotes a little amorous piece, containing a certain number of free unequal verfes, not tied either to the fcrupulous regularity of a fonnet, or the fubtlety of an epigram, but confifting of fome tender and delicate, yet fimple thought, fuitably expreffed.

Menage derives the word from *mandra*, which, in Latin and Greek, fignifies a fheepfold; imagining it to have been originally a kind of paftoral, or fhepherd's fong; whence the Italians formed their *madrigale*, and we *madrigal*. Others rather choofe to derive the word from *madrugar;* which, in the Spanifh, fignifies to rife in the morning; the *madrigals* being formerly fung early in the morning, by thofe who had a mind to ferenade their miftreffes.

Huet fuppofes it to be a corruption of *martegeaux*, a name given to the inhabitants of a diftrict of Provence, who either invented or excelled in this fpecies of compofition. If the origin is deduced from the Spaniards, it may have taken its name from a town in Spain, called *Madrigal*. Others, fuppofing that its firft application was to religious poems addreffed to the Virgin, *alla Madre*, derive from thence *madrialle*, and *madrigale*.

The madrigal, according to M. le Brun, is an epigram without any thing very brifk and fprightly in its fall, or clofe: fomething very tender and gallant is ufually the fubject of it: and a certain beautiful, noble, yet chafte fimplicity, forms its character.

The madrigal is ufually looked on as the fhorteft of all the leffer kinds of poems, except the epigram: it may confift of fewer verfes than either the fonnet, or roundelay. There is no other rule regarded in mingling the rhymes and verfes of different kinds, but the fancy and convenience of the author. This poem, however, really allows of lefs licence than many others; whether we regard the rhyme, the meafures, or the purity of expreffion. The term is alfo applied to a mufical compofition of three or more parts for different voices, adapted to the words of fuch poems.

MADRIGAL is likewife a mufical term for a vocal compofition, feldom in lefs than four parts. The etymology of this word has been much difputed. But it feems as if its firft application had been to fhort religious lyric poems, or hymns, addreffed to the virgin, *alla Madre*; whence *madriale* and *madrigale*; but being afterwards applied to poems on love and gallantry, by the Italians, French, and Spaniards, the original import has been forgotten. Indeed, the words of all the madrigals which we have feen of the 16th century, when they were moft in favour, feem to belong to the mother of love and gallantry; *alla madre, della gaia, madre galante, mater lætitiæ*, than to the Virgin, or religious fubjects. It never can have meant a morning fong, as fome have imagined; the Italians having been long in poffeffion of the term *matinata*, a lover's matins under the windows of his miftrefs; as they have of *fenerata*, an evening fong. This fpecies of mufic feems to have been brought to its higheft degree of perfection in Italy, by Luca Marenzio, at the latter end of the 16th century, after which time it foon declined, and loft the favour of the public.

Few Italian compofers of eminence produced madrigals after Luca Marenzio, except Stradella, and Aleffandro Scarlatti, which are admirable.

MADRIGAL, in *Geography*, a town of Spain, in Old Caftile, 27 miles N. of Avila.—Alfo, a town of Spain, in Old Caftile, near Olmedo, on the Adaja; 30 miles S. of Valladolid.—Alfo, a town of Popayan, in South America; 110 miles S. of Popayan. N. lat. 0° 50′. W. long. 75° 45′.

MADRIGOLO, a town of the duchy of Parma; fix miles W. of Parma.

MADRISIO, a town of Italy, in Friuli; 30 miles N. of Venice.

MADROGAN, or BANANATAPA, a town of Africa, in the kingdom of Mocaranga, in which is a palace of the king. S. lat. 18°. E. long. 29° 30′.

MADROV, a town of Hindooftan, in Myfore; 18 miles E.N.E. of Seringapatam.

MADRUSAVA, a town of Japan, in the ifland of Niphon; 36 miles S.E. of Xenday.

MADRUZZO, a town of the Tyrolefe; 4 miles W.S.W. of Trent.

MADS, in *Agriculture*, a provincial term applied to earth-worms.

MADSJAS, in *Geography*, a town of Arabia, in the province of Oman; 20 miles S.E. of Sohár.

MADUE SEE, a large lake of Hinder Pomerania, drained in 1770, and now inhabited.

MADUGAR, a town of Hindooftan, in the circar of Jyenagur; 10 miles S. of Jyepour.

MADURA, a province of Hindooftan, about 180 miles in length, and 80 in breadth, annexed in 1742 to the dominions of the nabob of Arcot.—Alfo, the capital of the above-named province, fortified with fquare towers and parapets, and well furnifhed with cannon. In 1757, this town was purchafed by the Britifh troops for 170,000 rupees. The pagoda of this place is one of the moft fuperb in Hindooftan; 80 miles S.S.W. of Tanjore. N. lat. 9° 52′. E. long. 78° 11′.

MADURA, an ifland and principality in the Eaft Indian fea, reckoned the fixth empire of Java, though not properly belonging to it, as it is a feparate ifland, divided from Java by a narrow ftrait. It is about 75 miles in length, and from nine to fifteen in breadth. It is very fertile in rice, for which it is one of the granaries of India; and while Java was in poffeffion of the Dutch (now, *i. e.* 1811, furrendered to the Englifh) it was under the government of a prince, who was the vaffal of the Dutch company. Its capital of the fame name lies on the S. coaft. S. lat. 6° 44′ to 7° 15′. E. long. 112° 14′.

MADZAR, a town of Ruffia, in the government of Caucafus; 56 miles E.N.E. of Ekaterinograd.

MÆCENAS, CAIUS CILNIUS, in *Biography*, an illuftrious Roman knight, defcended from the kings of Etruria, has rendered himfelf immortal by his liberal patronage of learned men and of letters, and to his prudence and advice Auguftus acknowledged himfelf indebted for the fecurity which he enjoyed. His love of pleafure removed him from the reach of ambition, and he preferred to die, as he had been born, a Roman knight, to all the honours and dignities which either the friendfhip of Auguftus or his own popularity could heap upon him. He attended the emperor through his various fortunes, and in some military actions he is said to have displayed both valour and skill. He, however, chiefly served his master in a civil capacity, and was one of the three intimates, who were delegated by him to effect an accommodation with Antony when he had laid siege to Brundusium. During a long period he held the important post of prefect of Rome, to which his political talents were peculiarly adapted, and with perfect fidelity to the emperor, and vigilance to maintain his interests, he was not chargeable with any acts of cruelty and oppression. It is to the honour of Augustus that he received the private admonitions of Mæcenas in the same friendly manner in which they were given, and he was not displeased with the liberty which he once took of sending to him a paper with these words written upon it, "surge carnifex," "rise butcher," while he was sitting on his judgment seat, and betraying revenge and impatience in his countenance. He was struck with the admonition, and left the tribunal without passing sentence of death on the criminals. No minister was more the personal friend of his sovereign than Mæcenas; for this it is thought he was partly indebted to the attachment of the emperor to his wife Terentia, at which the favourite disgracefully connived. It is said that a coolness took place in his latter years between him and the emperor, but at his death, which happened about the eighth year before the birth of Christ, he instituted him his general heir. Though a zealous patron of learning and learned men, he was a man addicted to the pursuit of pleasure. "Where vigilance was required," says Velleius Paterculus, "he was sleepless, provident, and active, but as soon as a relaxation from business could be permitted, he dissolved in a more than feminine indolence and delicacy." The style of his own compositions was infected with the same effeminacy which characterized his manners, but the soundness of his judgment with respect to the writings of others, seems apparent from the merit of those on whom he bestowed his patronage. His name is perpetuated by the two great Roman poets, Virgil and Horace: with the latter he lived upon a footing of freedom and familiarity, which does equal honour to both, and no name appears with so much distinction in his works as that of Mæcenas. Virgil dedicated to him his Georgics, which appear to have been composed at his request. So signal were his good offices towards literary genius, that the name of Mæcenas has ever since been applied to its liberal patrons. Of his own writings a single specimen only has come down to our times, the sense of which is, that he would be contented to live, though oppressed by almost any bodily sufferings and infirmities that could be accumulated, a sentiment which a Roman philosopher would despise, but which has been avowed by persons of our day, whose names will be perpetuated to distant ages by the works which they have left behind them: among these may be mentioned the celebrated Dr. Johnson, and the author of the Επεα πτεροεντα; the one from a dread of death, the other from an attachment to life: the latter, indeed, enduring much bodily pain, and very great infirmities for many years, in the midst of them all, never ceased to wish for a prolongation of life, nor to express a lively sense of the obligations he was under for a large balance of happiness in his favour; and on the tomb, intended by himself for his lifeless body, he inscribed, while living, the expressive epitaph, "Contented and Grateful." The historian Dio has attributed to Mæcenas the introduction of warm baths at Rome, and also the invention of a species of short-hand writing, by the aid of which orations could be taken down from the mouth of the speaker: other writers, however, ascribe this to Cicero's freedman Tiro. He is supposed to have been the author of a history of animals; a journal of the life of Augustus; a treatise on the different natures and kinds of precious stones, besides the two tragedies of Octavia and Prometheus, and other things that are lost. Univer. Hist.

MAEGOA, or Fremona, in *Geography*, a town of Abyssinia; 9 miles from Axum.

MAEL-Carhaix, a town of France, in the department of the Northern Coasts, and chief place of a canton, in the district of Guingamp. The place contains 1767, and the canton 7395 inhabitants, on a territory of 225 kiliometres, in eight communes.

Mael *Coronde*, in the *Language of the Celonese*, the flowering cinnamon-tree. This is a name given to a peculiar species of the cinnamon-tree, which is all the year round found full of flowers. The flowers are not easily to be distinguished from the very finest cinnamon-flowers, but they produce no fruit, which the flowers of the fine cinnamon always do. The bark is much like that of the best cinnamon, in external appearance; but it has very little taste or smell. The tree grows very large, and the inhabitants sometimes tap it, by boring a hole in the trunk, at which it bleeds a thin watery juice, in the manner of our birch-tree.

MÆANDER, in *Geography*, a river of Turkey, in Asia, which rises N. of the ancient city of Apamea, and runs in a winding stream, about 250 British miles, and not far from its mouth, is about 190 feet broad. It is called by the Turks Boone Minder, or Great Mæander, to distinguish it from another little stream, which resembles it in its course.

MÆATÆ, in *Ancient Geography*, a general name, which comprehended the following five British nations, *viz.* the Otodeni, Gadeni, Selgovæ, Nevantæ, and Dumnii, who possessed the country between the walls of Severus and Antoninus Pius. This name, used by the Greek and Roman writers, was probably not unknown to the Britons themselves; and is supposed by some to have been derived from two British words, *moi*, a plain, and *aitich*, inhabitants, and by others from *mean*, middle, and *aitich*, as being situated in the middle, between the provincial and unconquered Britons. We have sufficient evidence, that the Roman armies, under Julius Agricola and the emperor Severus, penetrated a considerable way into that part of Britain which lies to the N. of the wall of Antoninus Pius, between the firths of Forth and Clyde. Tacitus (Vit. Agric. c. 21 to 39.) gives a very distinct account of the first of these famous expeditions in Caledonia, and Dio Nicæus of the second. (Xiphilin. e Dione in Sever.) Many Roman coins have been found in several parts of that country, and there are still remaining in it very distinct vestiges of several Roman camps. But it is no less evident, that the Romans never formed any solid or permanent establishment beyond the wall of Antoninus, which was always considered as the utmost limit of the Roman empire in Britain.

MÆLER, in *Geography*, a very beautiful lake of Sweden, containing several islands rich in wood and pasture, with hilly shores, diversified with trees, villas, and farm-houses. It is usually frozen in winter, and opens an easy communication, by means of sledges, with Stockholm. See Arboga, Canal, and Trolhætta.

MAELLA, a town of Spain, in Aragon; 15 miles E. of Alcaniz.

MAELSTROM, a whirlpool in the North sea, near the island of Moskoe. Its noise is heard at the distance of several leagues, and it is so violent, that a vessel which comes near it is drawn irresistibly into the vortex, and carried immediately to the bottom, where it is dashed to pieces against the rocks. At flood tide the stream runs up into the country with a boisterous rapidity; and at ebb, it returns to the sea

 with

with a violence and noife not equalled by the loudeft cataracts. Whatever it carries down, it inftantly abforbs; but at the turn of ebb and flood, when the water becomes ftill, the fcattered fragments rife to the furface. When this whirlpool has been agitated by a ftorm, it reaches veffels to the diftance of five or fix Englifh miles, at a time when the crews have thought themfelves perfectly fecure. N. lat. 67° 40'. E. long. 11° 44'.

MÆMACTERION, Μαιμακτηριων, in *Chronology*, the fourth month of the Athenian year. It contained twenty-nine days, and anfwered to the latter part of our September and beginning of October. The Bœotians called it *alalcomenius*.

It took its name from the feftival Memacteria, facred to Jupiter, kept at this time.

MÆMACYLON, in the *Materia Medica*, a name given by Diofcorides, and the ancients in general, to the fruit of the *arbutus*, or ftrawberry-tree.

MÆNA, in *Ichthyology*, the name of a fmall fifh, caught in vaft abundance about the fhores of the Mediterranean, and common in the markets of Italy, where they are accounted but a poor fort of fifh, and fold at a very cheap rate. It is fomewhat of the figure of the perch, but broader and thinner, and is feldom above four or five inches in length.

MÆNA *Candida*, a name given by many authors to the fmaris. It is not very improper, for they are both of the fame genus of the fparus, and are very nearly allied to one another; the principal difference confifting in the tail and belly fins of the fmaris being red. See SPARUS.

MÆNALUS, in *Ancient Geography*, a mountain of the Peloponnefus, in Arcadia, mentioned by Strabo, Pliny, and Virgil. This mountain was particularly confecrated to Pan. Several towns were fituated on the extent of this, which were deftroyed, and whofe inhabitants affembled at Megalopolis,

MÆONIA, a country of Afia Minor, formerly comprehending that part of Lydia which lay eaftward towards mount Tmolus, and which was the fource of the Pactolus.—Alfo, a town of this province, fituated at the foot of mount Tmolus.

MÆOTÆ, a Scythian people who inhabited the banks of the Palus Mæotis, and who gave their name to this lake.

MÆOTIS, or MÆOTIS *Palus*. See *Sea of* AZOF.

MAERHUET, in *Geography*, a town of Sweden, in Smaland; 31 miles N.W. of Calmar.

MAERNA, a town of the Tyrol; 23 miles W.S.W. of Trent.

MAERSE, a town of Holland, in the department of Utrecht; 5 miles N.W. of Utrecht.

MÆRUA, in *Botany*, fo called by Forfkäll from its Arabic name *Meru*, is one of his genera, adopted by Juffieu, Vahl and Willdenow.—Vahl Symb. p. 1. 36. Willd. v. 2. 1168. Juff. 440. Clafs and order, *Polyandria Monogynia*. Nat. Ord. *Plantæ incertæ fedis*, Juff.

Gen. Ch. *Cal.* Perianth of one leaf, tubular, coriaceous, four-cleft; tube fquare, fhort, broader upwards; fegments of the limb oblong, obtufe, reflexed, a little longer than the tube. *Cor.* none. *Nectary* at the mouth of the tube of the calyx, entire or divided, fhorter than the calyx, conniving, covering the ftalk of the germen. *Stam.* Filaments numerous, at the bafe of the germen, thread-fhaped, twice as long as the calyx; anthers oblong, incumbent. *Pift.* Germen cylindrical, fhorter than the filaments, fmooth, on a thread-fhaped, fquare ftalk, the length of the tube, fwelling upwards; ftyle none; ftigma obtufe. *Peric.* and *Seeds* unknown.

Eff. Ch. Calyx four-cleft, with the nectary in its tube. Corolla none. Stigma feffile.

Obf. This genus is clofely akin to *Grewia*, as Vahl obferves, but differs fufficiently from that in having a four-cleft calyx, a nectary crowning the mouth of the tube, and a feffile ftigma.

1. M. *uniflora*. Vahl and Willd. (M. craffifolia; Forfk. Defcr. 104.)—Stalks fingle-flowered. Nectary many-cleft. A native of Arabia Felix.—This *fhrub* is furnifhed with round, fpreading, very fmooth *branches*, and a purplifh *bark*: *Leaves* alternate, on footftalks, fcattered, often many from the fame bud, oval, entire, pointed, thick. *Flowers* axillary, each placed on a folitary, thread-fhaped ftalk, twice as long as the leaves. *Nectary* divided into many thread-fhaped fegments.

2. M. *racemofa*. Vahl and Willd.—Flowers racemofe. Nectary undivided.—Alfo a native of Arabia Felix.—*Branches* round and fmooth. *Leaves* on footftalks, remote, pendent, oval, pointed, retufe, entire, fmooth, half an inch long; footftalk fhorter than the leaf. *Clufters* of flowers terminal, drooping. *Nectary* undivided.

MAES, GODFREY, in *Biography*. Amidft thofe who practifed the art of painting in the Flemifh fchool, after the aftonifhing powers of Rubens were developed, this artift held a confiderable rank. He was born at Antwerp in 1660, and having received early inftructions from his father, he improved and perfected himfelf by ftudying and copying the fine pictures placed in the great churches and cabinets of his native city.

His works, when he began to practife upon his own invention, were highly approved; and he was much employed both publicly and privately, till at laft he was appointed to the diftinguifhed ftation of director of the academy at Antwerp.

MÆSA, in *Botany*, fo called by Forfkäll, and by him alone; all fucceeding authors having agreed that the plant in queftion is not generically diftinct from BÆOBOTRYS, (fee that article)—Willdenow, Vahl and Martyn call the *Mæfa* of Forfkäll *B. lanceolata*.—Juffieu fuggefts the affinity of this genus to Thunberg's *Aucuba*.

MAESEYK, in *Geography*, a town of France, in the department of the Lower Meufe, feated on the Meufe; 30 miles N.N.E. of Liege. N. lat. 51° 4'. E. long. 5° 47'.

MAESLAND, or MAESLAND SLUYS, a town of Holland, on a canal that forms a communication between Delft and the Meufe; the inhabitants of which are principally occupied in the herring and whale fifhery; 7 miles S. of Delft.

MÆSTLINUS, MICHAEL, in *Biography*, a German aftronomer, was born in the duchy of Wirtemberg, and became mathematical profeffor at Tubingen, where he died in 1590, at the age of forty-eight, leaving behind him feveral works on mathematics and aftronomy. In early youth he made a fpeech in favour of Copernicus's fyftem, which is faid to have brought the afterwards celebrated Galileo over from the philofophy of Ariftotle and Ptolemy, to whofe fyftems he had been previoufly devoted. Kepler was one of the pupils of Mæftlinus, and has, in his own work entitled "Aftronomia Optica," commended feveral of his inventions. Martin. Biog. Phil.

MAESTOSO, in the *Italian Mufic*, majeftic, fpirited, but not quick.

MAESTRICHT, in *Geography*, a town of France, and principal place of a diftrict, in the department of the Lower Meufe;

Meuse; formerly one of the largest, as well as the most ancient towns in the Netherlands, and belonging to the duchy of Lorrain. The possession of it was secured by Charles V. in 1530, at the diet of Augsburg; and he united it to the duchy of Brabant. Its magistracy is composed of two burgomasters, one a Catholic, the other a Protestant, and 20 echevins, half Catholics and half Protestants. It was formerly a bishop's see; but the see was removed in 710, by St. Hubert to Liege. It has two collegiate, and several parish churches, and before the revolution it had several religious houses: its town-house is handsome, and it has a good library. It has been fortified at different times by the Spaniards, Dutch, to whom it was ceded by the peace of Nimeguen in 1678, and French, when they had respectively possession of it.

The ramparts of Maestricht consist of the old inclosure, flanked with small towers and ancient bastions. But the principal strength of the place lies in several detached bastions, some great, some small, in several horn-works, and a covert-place, in some places double, and in others treble, the whole supported by a vast number of mines. They can form two inundations round the town, to prevent its being approached, one above, the other below the city; besides, on the south side of the town, towards Liege, there is a very strong entrenchment on the declivity of a hill, called fort St. Pierre, able to hold 13 or 14,000 men, which, with the help of several redoubts well planted with artillery, are capable of being a great obstruction to an army that would undertake the siege of the town. This fort consists of a large bastion with a very good casemate, a counterscarp, and two covert-ways; the whole supported with entrenchments which extend right and left to the inundation formed by the little river Jeker. The suburb of Wyck has a rampart a quarter of a league in circumference, flanked with three large bastions, joining to the body of the place. It has likewise another inclosure of earth, flanked with several bastions, ravelins, and a good covert-way. There are likewise two isles, one above, and the other below the bridge, which are strongly entrenched and defended with redoubts and other works. In short, Maestricht is justly looked upon as one of the strongest places in Europe. Near it are large stone quarries, in which are subterraneous passages of great extent, where the farmers frequently store hay, corn, and other articles.

On the 23d of February 1793, it was bombarded by the French, under general Miranda; but being attacked by general Clairfayt on the 1st of March, the republicans lost 2000 men, and nine pieces of artillery, and were compelled to raise the siege. On the fourth of November, the city was taken by the French, the garrison, consisting of between seven and eight thousand men, surrendering themselves prisoners of war. The town contains 17,963, and its two cantons 29,245 inhabitants, on a territory of 120 kiliometres, in 22 communes; 15 miles N. of Liege. N lat. 50° 48'. E. long. 5° 43'.

MAESTRO, a town of Italy, in the Paduan territory; 8 miles N.W. of Venice.

Maestro, a master; as *Maestro di cappella*, the master of a choir, or the composer in a cathedral. It is likewise a title given, by courtesy, to the composer of an opera, the master who presides at a harpsichord in a concert, and sometimes to a mere music master.

MAESWINES Bay, in *Geography*, a harbour of Ireland, in the county of Donegal, being one of the many inlets in the bay of Donegal. It lies W. of St. John's Point and E. of the harbour of Killybegs.

MAEVA, a town of Russia, in the government of Irkutsk, on the Lena; 20 miles N.N.W. of Vercholensk.

MAFAMEDE, a small island in the Indian sea, near the coast of Africa. S. lat. 16° 20'.

MAFARECK, a town of Egypt; 30 miles N.E. of Kous.

MAFFÆUS, Vegio, in *Biography*, a Latin poet, was born at Lodi, in the Milanese, in the year 1407. He was educated for the law, but soon shewed an attachment to the belles lettres, and in future life had the happy art of blending the charms of poetry with the gravity of jurisprudence. He obtained the professorship of the law at Pavia, from whence he was called to Rome, where he held some considerable offices at the church of St. John de Lateran. He died in 1458: his chief works are, 1st, "De Educatione Liberorum," and, 2dly, "Poetical Pieces," of which the most remarkable was a poem called a continuation of the Æneid of Virgil, which has been translated into English burlesque by Mr. John Ellis.

Maffæus, Bernardin, a learned cardinal, who died at Rome, at the age of 40, about the year 1553. He is known as the commentator on Cicero's epistles, and as the author of a treatise on medals and inscriptions. Moreri.

Maffæus, or Maffei, John Peter, was born at Bergamo in 1536, and was instructed by his uncles Basil and Chrysostom Zanchi, nobles of that city, in the ancient languages, and in philosophy and theology. In 1563 he was appointed professor of eloquence at Genoa, with an ample salary. During the two years which he continued in that office he acquired great applause, and was chosen to the office of secretary of state; in 1565, he returned to Rome, where he entered into the society of Jesuits. He spent six years as professor of eloquence in the Roman college, during which he translated, into the Latin language, the history of the Indies by Acosta, which was published in 1570; after this he was invited to Lisbon by cardinal Henry, to draw up, from papers and other documents with which he was to be furnished, a complete history of the Portuguese conquests in the Indies, and of the progress of the Christian religion in those countries. He returned to Italy in 1581, and spent several years, partly at Rome and partly at Sienna, in learned labours, and at length was placed, by Clement VIII. in the Vatican, for the purpose of continuing, in the Latin language, the annals of Gregory XIII. begun by him in the Italian. He died at Tivoli in October 1603. He wrote the life of Ignatius Loyola, but his principal work is entitled "Historiarum Indicarum, Lib. xvi." which has been frequently reprinted. The best edition is in two volumes 4to. printed at Bergamo in 1747. His works are chiefly to be regarded on account of the purity of the style in which they are written. Moreri.

Maffæus, Francis-Scipio, an Italian marquis, and elegant writer in his native language, was born at Verona in 1675. His early education was entirely conducted by his mother, a woman of very superior accomplishments, but as soon as he was of a proper age, he was sent to the Jesuits' college at Parma, where he distinguished himself by his attachment to poetry. Having completed his studies, he visited Milan, Genoa, and Rome, and at the last named city he was admitted into the Academy degli Arcadi. He now devoted himself to the pursuits of polite literature. Uniting the spirit of philosophy with that of gallantry, he maintained, before an assembly of both sexes in the academy of Verona, certain "Conclusioni d'Amore," in which the elegance of his language and the vivacity of his sentiments were equally admired. For a short time he quitted the arts of peace and joined

joined the army, in which he ferved as a volunteer at the battle of Donawert in 1704, under the command of his fecond brother, who was general of the Bavarian troops in alliance with France: during the campaign he had an opportunity of faving his brother's life, by difarming an officer whofe piftol was pointed at him. At the conclufion of the campaign he returned to Verona, and refumed thofe literary occupations which he never after forfook. He fet himfelf to reform the ftage, and produced, by way of model, his tragedy of "Merope." About the fame time he undertook the more important tafk of reforming the moral principles of his countrymen, efpecially with regard to the practice of duelling, to which his brother had nearly fallen a facrifice. On this fubject he publifhed two works, of which the latter, entitled "Della fcienza chiamata cavallerefca," he dedicated to pope Clement XI. This was a performance of much learned refearch and folid argument, and fo well written in every refpect, that it acquired general applaufe, and paffed through feveral editions. His "Merope," already noticed, was exceedingly popular, and was tranflated into moft of the modern languages. By fome of his contemporaries it was feverely criticifed and violently cenfured: among thefe was Voltaire, who afterwards attempted to rival it by a tragedy of the fame name, which is reckoned one of his beft pieces. Maffæus foon after wrote a comedy, entitled "Commedia delle Cerimonie;" and a drama, called "La Fida Ninfa." He was indefatigable in his ftudies of antiquity and theology, with the view of promoting the honour of his native country, and the fpreading of the Roman Catholic religion. One of his moft ufeful works on the fubject of antiquities was his "Iftoria Diplomatica," being an introduction to the critical knowledge of pieces diftinguifhed under the name of diplomas, with a collection of feveral documents hitherto inedited. In 1732 he raifed a durable monument to the fame of his native city, by a learned work, entitled "Verona Illuftrata." This piece is comprifed in four parts, and is replete with curious information relative to the hiftory and antiquities of the north of Italy, and ranks among the ableft and moft interefting of topographical works. His principal object in a tour undertaken through foreign countries, was the collection of ancient infcriptions, with the defign of uniting them with thofe collected by Gruter, and other writers on the fame fubject. In his journey he vifited every place where the relics of antiquity and the cabinets of the curious were to be found. On his arrival at Paris, he printed an account of what he had feen under the title of "Galliæ Antiquitates quædam felectæ." Here he was elected a foreign member of the Academy of Infcriptions, and was a frequent attendant on its meetings. The difputes concerning the bull Unigenitus interefted him fo warmly, that he ftudied the fubjects in difpute with the utmoft zeal, and in a fhort time produced an elaborate folio volume, the refult of his theological reading. In this he appeared as the champion of the Moliniſts againſt the Janfenifts, and the defender of the bull Unigenitus. This was not publifhed till the year 1742, and previoufly to it he paffed from Paris to London, where he was diftinguifhed by the notice of the royal family, feveral of the nobility, and by the moft eminent men of letters. He vifited both univerfities, and received at Oxford, in compliment to his literary merit, the degree of doctor of laws. From England he went to Holland and Flanders, and proceeded through Germany to Vienna, where he had a moft gracious reception from the emperor Charles VI. He returned to Verona in 1736, and immediately began to publifh the "Offervazioni Letterarie," intended as a continuation of the Italian literary journal. Several original pieces of Maffæus, relative to his hiftory and antiquities, appeared in the fucceffive tomes of his works. The true members of the church of Rome having maintained, in oppofition to the Jefuits, that taking intereft of money to any degree was the crime of ufury, Maffæus oppofed this doctrine in a work entitled "Dell' Impiego del Danaro," which was a learned and rational differtation on the employment of money in ancient times, and the true principles of morality and policy on this head. For this treatife he incurred the charge of herefy, and was banifhed the city: the ftorm at length paffed over, and he returned in triumph. After this he publifhed many other pieces on various topics; among thefe was a metrical verfion of the two books of the Iliad; fome Hebrew poetry; and enquiries into the generation of lightning and other phyfical phenomena in nature. Ever actuated by a defire of advancing the glory of his native city, in which he had already promoted the liberal ftudies, by tranfplanting a colony of learned teachers from the Arcadi at Rome, and eftablifhing a literary affembly in his own houfe, he exerted himfelf in laying the foundation of a mufeum of antiquities and curiofities, which became confiderable, and was announced to the public by a catalogue entitled "Mufeo Veronefe." In 1749 he endeavoured to correct the popular notions concerning magic and witchcraft, by a treatife, "Arte magica dileguata," which brought upon him a hoft of enemies, of whom fourteen replied to his reafonings. He was not, however, to be intimidated, and juftified himfelf by the publication of two other pamphlets on the fame fubject. His next work was entitled "De' Teatri Antichi e Moderni," in which he attempted a vindication of theatrical fpectacles, in oppofition to thofe who maintained that they were all unlawful. He continued to devife new plans, to augment and confirm his literary reputation till the year 1754, when the effects of old age and the feverity of winter threatened him with immediate diffolution. As foon as his danger was known in the city, the council ordered public prayers to be put up for him during three days. His valuable life was protracted a few weeks only, and on the 11th of February 1755, he expired, in the 79th year of his age. He was interred amidft a vaft concourfe of mourning fellow citizens, and a ftatue was erected to his memory in the principal fquare, by the fide of thofe of Fracaftoro, and others who had conferred honour on Verona. Gen. Biog.

MAFFAH, *Old* and *New*, in *Geography*, two towns of the ifland of Madagafcar; the firft fituated on the N.W. coaft, in S. lat. 15° 22′. E. long. 51°; and the fecond, 25 miles S.E. of the other.

MAFFERSDORF, a town of Bohemia, in the circle of Boleflaw; 10 miles N. of Turnau.

MAFFRA, a town of Portugal, in the province of Eftramadura, containing about 1040 inhabitants; near which king John V. erected a magnificent building; in confequence of a vow, made in a dangerous fit of illnefs, to found a convent for the ufe of the pooreft priory in the kingdom, which was found to be that of Maffra. The building was defigned to exceed even the Efcurial; it is conftructed of white marble, contains 37 windows in front, and is nearly a fquare of 728 feet; in the centre is the church, with the palace on one fide and the convent on the other. This ftructure was commenced by order of king John V. in 1717, and finifhed in 1742, the architect being a German, named John Frederic. In the whole building, it is faid, there are 870 rooms, and 520 windows; five miles N.W. of Lifbon.

MAFMALA, a fmall ifland in the Indian fea, near the coaft of Africa. S. lat. 16° 20′.

MAFORTIUM, among the *Romans*, a veil or head-drefs worn by the married women.

MAFRAGG, in *Geography*, a river of Africa, in Algiers, which

which runs into the Mediterranean, near Cape Roſa; anciently called "Rubricalus."

MAFUMO, or English River, a river of Africa, which runs into Delagoa bay, navigable for large veſſels; its channel is about a mile wide; and ſhips lie commonly about two miles up the river, where, in good depth of water, they are ſafe from all winds and ſupplied plentifully with proviſions, ſuch as beef, goats, fowls, fiſh, lemons, oranges, ſweet potatoes, and other vegetables, with good water on both ſides of the river. S. lat. 26°.

MAGACELA, a town of Spain, in Eſtramadura; 18 miles E.S.E. of Merida.

MAGADA, in *Mythology*, a title under which Venus was known and worſhipped in Lower Saxony; where this goddeſs had a famous temple, which was treated with reſpect even by the Huns and Vandals, when they ravaged the country. It is ſaid to have been deſtroyed by Charlemagne.

MAGADINO, in *Geography*, a town of Italy, in the bailiwick of Locarno, on the lake of that name; five miles S. of Belinzona.

MAGADIS, Magas, from μαγαδίζειν, *to ſing*, or *play in uniſon* or *octave*, the name of a muſical inſtrument in uſe among the ancients.

There were two kinds of magades, the one a ſtringed inſtrument, formed of twenty chords, arranged in pairs, and tuned to uniſon or octave, ſo that they yielded ten ſounds; the invention of which is aſcribed by ſome to Sappho; by others to the Lydians; and by ſome to Timotheus of Miletus.

The other was a kind of flute, which, at the ſame time, yielded very high and very low notes. The former kind was, at leaſt, much improved by Timotheus of Miletus, who is ſaid to have been impeached of a crime, becauſe, by increaſing the number of chords, he ſpoiled and diſcredited the ancient muſic.

Among all obſcure terms in the ancient Greek muſic, which have bewildered modern inquirers, few have perplexed them more than this, and its meaning is ſtill ſo far from ſettled, that we have yet to learn whether it was a wind or a ſtringed inſtrument; or, indeed, whether it was any inſtrument at all, or any thing more than a monochord, or the bridge of an inſtrument. Rouſſeau aſſures us, that the verb, *to magadire*, in the Greek muſic, implied to ſing in the octaves, as a man and a woman, or a boy, naturally do; and adds, that as the word comes from *magas*, the bridge of an inſtrument, by extenſion it was applied to an inſtrument with double ſtrings tuned octaves to each other, like the uniſons and octave in our old double harpſichord.

MAGADOXO, Magadosho, or *Maldoſcho*, in *Geography*, a kingdom of Africa, ſituated along the coaſt of the Indian ſea, from the river Jubo, near the equinoctial line, to beyond the fifth degree of north latitude. Its name is derived from its capital, which is ſituated in a large bay, formed by the mouth of a river of the ſame name, called by the Arabs, "the Nile of Magadoxo," on account of its annual overflowing. The ſource of this river is not aſcertained, but its courſe is concluded to be long, from its conſiderable channel and large bay, and alſo from its extenſive inundations, which ſupply various canals, and fertilize the country through which it runs, ſo that it produces in abundance wheat and barley, and a variety of fruits, and ſupplies food for numbers of horſes, oxen, ſheep, and other animals which are bred near its banks. The city of Magadoxo is a place of great commerce, and vaſt reſort from Aden and other parts; whence their merchants bring cotton, ſilk, and other cloths, ſpices, and drugs, which they exchange with the inhabitants for gold, ivory, wax, and other commodities. The inhabitants are chiefly Mahometans, among whom are many Bedouin Arabs, who retain their ancient ſuperſtitions, and farther inland there is a greater number of Abyſſinian Chriſtians, ſubject or tributary to that empire. The king and his court are Mahometans; his ſubjects, of whom ſome are white, others tawny and olive, and others black, all ſpeak the Arabic tongue. They are ſtout and warlike, and uſe, among others, poiſoned arrows and lances. The town is ſituated in N. lat. 2° 6'. E. long. 45° 50'.

MAGALAWAUK, a town of Hindooſtan, in Myſore; 10 miles W.S.W. of Punganore.

MAGALHAENS, Ferdinand de, in *Biography*, commonly known by the name of Magellan, an eminent navigator, was by birth a Portugueſe. He ſerved with much reputation during five years under Albuquerque, in the Eaſt Indies, and particularly diſtinguiſhed himſelf at the conqueſt of Malacca in the year 1510. After this, thinking his ſervices had been but miſerably requited by his own court, he entered into the employment of Charles V. king of Spain, who gave him the command of a fleet, with which, in 1519, he diſcovered the ſtraits called after himſelf at the extremity of South America. Soon after this he took poſſeſſion of the Ladrone and Philippine iſlands in the name of the monarch in whoſe ſervice he was engaged. At one of the latter, named Zebu, Magalhaens obtained the converſion of the king, having aſſured him that by becoming a Chriſtian he would be rendered ſuperior to his enemies. Under the farther condition of his becoming a vaſſal to Spain, the Portugueſe aſſiſted him in his attempts to reduce to ſubjection the neighbouring chieftains, and the holy croſs was erected over the ſmoking aſhes of ſome villages that had been plundered and deſtroyed. In one inſtance his authority was ſet at nought, and he determined to inflict a ſummary vengeance on the rebellious chief: he accordingly landed with about fifty of his men upon the iſland of Matan, and was met by the chief and his people, who though rudely armed, and ſubject to no regular diſcipline, made a formidable reſiſtance during the greateſt part of a day. At length the fire of the Spaniards ſlackened from want of ammunition, and the iſlanders preſſing on, a retreat became neceſſary. Magalhaens received a wound from an arrow in the leg, and being ill ſupported by his men, he was beaten down and ſlain by a lance. This happened in 1521, and by this act of imprudence he loſt the honour of being the firſt circumnavigator of the globe. He has, however, ſecured to himſelf a high reputation among maritime diſcoverers, by the commencement of this great enterprize. Barney's Diſcovery in the South Sea.

MAGALOTTI, *Count* Lawrence, a celebrated philoſopher and mathematician, was born at Rome in 1637. Having been initiated in the elements of learning, he was ſent to the univerſity of Piſa, for the purpoſe of ſtudying juriſprudence, in which he made a great and very rapid progreſs, but the bent of his genius led him to devote his main attention to the ſtudy of mathematics and natural philoſophy. He cultivated theſe branches of ſcience at Florence, during three years, under the celebrated Vincent Viviani, and was, by his recommendation, and that of Borelli, made ſecretary to the Academy del Cimento, which had been eſtabliſhed, in 1656, by prince Leopold of Tuſcany, for the expreſs purpoſe of elucidating philoſophical ſcience by a ſeries of experiments. The duties of this appointment Magalotti diſcharged with the utmoſt aſſiduity and care, and being directed by the prince to draw up an account of the experiments made there, he aimed at rendering his work popular, as well from its elegance as from

from the perſpicuity of its ſtyle. The work was accordingly publiſhed in the year 1666, and was received with univerſal applauſe by men of ſcience. The ſubjects which it embraces are the preſſure of the air; natural and artificial freezing; the various effects of heat and cold; the compreſſion of water; magnetiſm; the nature of colours; of ſounds; the projection of bodies, &c. While the ſecretary was engaged in drawing up his account of the experiments of the academy, he obtained leave from Leopold to pay a viſit to his father at Rome, where he wiſhed to conſult the learned Angelo Rici on the ſubject of that work; but the chief object of his journey was to obtain ſome eccleſiaſtical promotion. Having failed in this object, he determined to return to Florence, and to apply for a place at the court of the grand duke Ferdinand II. In this he was ſucceſsful; and ſhortly after a penſion was given him by pope Alexander VII., to whom prince Leopold had preſented a conſiderable part of the inſtruments uſed in making the experiments at the academy. He attempted a work on electricity, but the ſcience was too much in its infancy, and the facts known reſpecting it were too ſcanty to admit of much being done in it. While engaged in theſe purſuits he did not neglect his favourite ſtudy aſtronomy, and at the ſame time paid ſome attention to theology, particularly to the writings of the fathers. About the year 1666, he drew up and publiſhed a ſmall volume relative to the hiſtory and peculiarities of China, which was received with great applauſe; and at the ſame time he publiſhed a ſmall, but elegant Compendium of the Moral Doctrine of Confucius. He was a good poet, and the firſt perſon who publiſhed a good tranſlation of the Odes of Anacreon in Italian verſe. He was very converſant in many of the modern languages, and could write and ſpeak French, Spaniſh, and Engliſh, with the correctneſs and eaſe of the natives of thoſe countries. Of this he gave abundant evidence in different viſits which he paid to them either in a private or official character. In England he was the intimate friend and boſom companion of the illuſtrious Mr. Robert Boyle, whom he attempted to convert from the errors of the Proteſtant faith, but the Engliſh philoſopher was too well grounded in the evidences of his religion to be moved by the eloquence of his Catholic friend. He was employed in ſeveral miſſions to foreign princes, and at length, in 1674, he was appointed ambaſſador to the imperial court. At Vienna he was received in the moſt honourable manner by perſons of all ranks, and acquired the particular favour of the emperor. Here he formed an intimate connection with the men moſt eminent for ſcience and literature, and ſpent his time agreeably in learned leiſure, till he was embarraſſed by the delay of the neceſſary pecuniary remittances from his court. He now determined to return to Florence without waiting the permiſſion of the duke. Shortly after, that prince ſuperſeded him in his embaſſy to Vienna, and gave him apartments in his palace, with a conſiderable penſion. This was not exactly the thing which he wiſhed, and which his ſervices ſeem to have claimed; he therefore withdrew into retirement, and gave himſelf up entirely to his ſtudies. In 1684, he compoſed fifteen Italian odes, in which he has drawn the picture of a woman of noble birth, and exquiſite beauty, diſtinguiſhed not only by every perſonal, but by every mental charm, and yet rendering herſelf chiefly the object of admiration and delight by her manners and conduct. Not believing that ſuch an original exiſted in nature, he gave this piece the title of "The Imaginary Lady." His next work conſiſted of Letters againſt Atheiſts, in which his learning and philoſophy appear to great advantage. In the year 1689, he was appointed a counſellor of ſtate to the grand duke, who ſent him his ambaſſador into Spain to negotiate a marriage between one of his daughters and king Charles II. Soon after he had accompliſhed the object of this miſſion he ſunk into a temporary melancholy, which led him to exclude himſelf from all intercourſe with the world for nearly a year, till by the intreaties of the grand duke he was induced to return to his poſt at court. He now reſumed very ſucceſsfully his literary labours, and publiſhed works upon various ſubjects, and left others which were given to the world after his deceaſe, which happened in the year 1712, when he had attained the age of 75. Magalotti was as eminent for his piety as he was for his literary talents; unimpeachable in his morals, liberal, beneficent, friendly, polite, and a lively and cheerful, as well as very inſtructive companion. His houſe was the conſtant reſort of men of letters from all countries, whom he treated with elegant hoſpitality. He was deeply converſant with the writings of the ancient philoſophers, and was a follower of the Platonic doctrine in his poems. In his natural and philoſophical inveſtigations he diſcarded all authority, and ſubmitted to no other guide but experiment. Among the moderns he was particularly attached to Galileo. After his death a medal was ſtruck in honour of his memory, with the figure of Apollo raiſed on the reverſe, and the inſcription OMNIA LUSTRAT. In the General Biography is given a long liſt of his various publications, taken from the third vol. of the well known work entitled "Fabronii Vit. Italorum doct. excell."

MAGAME, in *Geography*, a town of the iſland of Ceylon, near the E. coaſt; 96 miles S.E. of Candy.

MAGAN, a town of Spain, in New Caſtile; 8 miles N.N.E. of Toledo.

MAGANJA, a river of Africa, which runs into the Zambeze, S. lat. 16° 20′. E. long. 33° 40′.

MAGAPERAM, a town of Hindooſtan, in the circar of Cuddapa; 14 miles N.N.E. of Combam.

MAGARABA, a mountain of Africa, in Algiers, extending about 30 miles along the coaſt of the Mediterranean, inhabited by a people called "Magarabas," deſcended from the Berberes, who live in tents, feed large flocks, and pay a tribute to the dey of Algiers.

MAGARZAN, an iſland in the Red ſea, near the coaſt of Nubia; it is high, and the largeſt of three forming a triangle, about five miles in length. N. lat. 21° 10′.

MAGAS, in the *Ancient Muſic*, is uſed to denote the bridge of any inſtrument. See MAGADIS.

MAGASSA, in *Geography*, a town of Tyrol; 24 miles W.S.W. of Trent.

MAGATTI, CÆSAR, in *Biography*, (or, as he was called in his Latin writings, *Magatus*,) an eminent ſurgeon, was the ſon of a reſpectable citizen of Scandiano, in the duchy of Reggio, where he was born in 1579. He diſtinguiſhed himſelf by his early proficiency in philoſophy and medicine at Bologna, at which univerſity he received the degree of doctor in both theſe ſciences, in March 1597, in the 18th year of his age. He ſtill remained at that place, however, attending the public hoſpitals, under the direction of the moſt eminent phyſicians, for ſome time; and afterwards went to Rome, where he united the ſtudy of anatomy and ſurgery, with that of medicine. Returning to his native country, he commenced the practice of his profeſſion, where he ſoon acquired ſo much reputation, that the marquis of Bentivoglio induced him to ſettle at Ferrara, as profeſſor of ſurgery in the univerſity of that city. Here, however, he met with conſiderable oppoſition and enmity from the eſtabliſhed practitioners, who interdicted him from practising, unless he would submit to their examinations; with which he at length complied, and gave abundant proofs of superior talents and acquirements. He soon attained the highest professional reputation at Ferrara, and gained the greatest applause from numerous classes of students by his able conduct in the chair, until he was seized with a severe illness, under the impression of which he was induced to enter into the fraternity of Capuchins, and afterwards assumed the habit of the order. He still continued, however, to practise medicine and surgery, in his new condition, with a success that acquired him the confidence of persons of the first rank, especially of Francis I. duke of Modena. But the severity of his sufferings from the stone induced him, in 1647, to repair to Bologna, for the purpose of relieving himself by undergoing the operation of lithotomy; but he survived it a very short time, and died at the age of sixty-eight.

Magatus was the author of a considerable improvement in the art of surgery, by his work entitled "De rara Medicatione Vulnerum, seu, de Vulneribus raro tractandis," Venice, 1616, which he also strenuously inculcated in his lectures, and the good effects of which he had often witnessed during his attendance at Rome. This was the rejection of tents in the treatment of wounds, and the recommendation of a simple easy method of dressing, without the irritation of frequently cleansing and rubbing the tender granulations; a practice which he supported at great length by sound and rational arguments, tinctured a little, however, by the Galenical theories. His work contains also a number of valuable observations respecting particular wounds; and it has an appendix, relating to gun-shot wounds, in which he refutes the notion of their being envenomed, or attended with cauterization. Sennertus published a criticism on his work, containing a defence of the use of tents; to which Magatus, now a monk, replied, in the name of his brother John Baptist, (if that was not his own conventual name) by publishing a pamphlet, with the title of "Tractatus, quo rara Vulnerum deligatio defenditur contra Sennertum," 1627, which is to be found in the Venice edition of the former work, published in 1676. Eloy Dict. Hist. de la Méd. Gen. Biog.

MAGAZINE, Literary, a miscellaneous, periodical pamphlet, containing a variety of essays, in prose and verse. The term, as applied to literature, is modern, but is now become of extensive and popular import. In England it was first employed in "The Gentleman's Magazine," the first number of which was published January 1, 1731; and this has been regularly continued every month from that time to the present. This was not the earliest periodical publication in monthly numbers, as one had appeared in the year 1681, under the title of "The Monthly Recorder of all true Occurrences both Foreign and Domestic." Soon after "The Gentleman's Magazine," a rival work, under the title of "The London Magazine," was published, but this was discontinued in the year 1785.

"The invention of this new species of publication," observes Dr. Kippis, in his memoir of Edward Cave, in the Biographia Britannica, "may be considered as something of an epocha in the literary history of the country. The periodical publications before that time, (*i. e.* 1731) were almost wholly confined to political transactions and to foreign and domestic occurrences: but the magazines have opened a way for every kind of inquiry. The intelligence and discussion contained in them are very extensive and various; and they have been the means of diffusing a general habit of reading through the nation; which in a certain degree hath enlarged the public understanding. Many young authors, who have risen to considerable eminence in the literary world, have here made their first attempts in composition. If it were not an invidious task, the history of them would be no incurious or unentertaining subject." In a former part of this dictionary, we have given a brief history of Newspapers, Magazines under the term "Journal," but if the reader be desirous of obtaining an ample account of periodical literature, he will find it fully narrated in "Nichols's Literary Anecdotes of the eighteenth Century," 6 vols. 8vo.

Magazine, in the *Military Art*, a place in fortified towns, where all sorts of stores are kept; and where carpenters, wheelwrights, smiths, &c. are employed in making things needful to furnish out the train of artillery.

Magazine, *Powder*, is a building constructed for keeping large quantities of powder. These magazines were formerly towers erected in the town walls; but many inconveniences attending this situation of them, they are now placed in different parts of the town. They were at first constructed with Gothic arches; but M. Vauban, finding these too weak, constructed them in a semicircular form, of the following dimensions, *viz.* sixty feet long within, and twenty-five broad; the foundation eight or nine feet thick; and eight feet high from the foundation to the spring of the arch; the floor about two feet from the ground, to prevent damp; and consequently six feet for the height of the story.

The thinnest part or hanches of the arch is three feet thick, and the arch made of four lesser ones one over the other, and the outside of the whole terminated in a slope to form the roof; from the highest part of the arch to the ridges is eight feet, which makes the angle somewhat greater than ninety degrees; the two wings, or gable ends, are four feet thick, raised somewhat higher than the roof, as is customary in other buildings; as to their foundations they are five feet thick, and as deep as the nature of the ground required.

The piers or long sides are supported by four counterforts, each six feet broad, and four feet long, and their interval twelve feet; between the intervals of the counterforts, are air-holes, in order to keep the magazine dry and free from dampness; the dices of these air-holes are commonly a foot and a half every way, and the vacant space round them three inches, made so, as the in and outsides be in the same direction. The dices serve to prevent an enemy from throwing fire in to burn the magazine, and for a farther precaution, it is necessary to stop these holes with several iron plates, that have small holes in them like a skimmer, otherwise fire might be tied to the tail of some small animal, and so drive it in that way; this would be no hard matter to do, since, where this precaution had been neglected, egg-shells have been found within, that have been carried there by weasles.

To keep the floor from dampness, beams are laid long ways, and to prevent these beams from being soon rotten, large stones are laid under them; these beams are eight or nine inches square, or rather ten high and eight broad, which is better, and eighteen inches distant from each other; their interval is filled with dry sea coals, or chips of dry stones, then over these beams are others laid cross-ways, four inches broad, and five high, which are covered with two-inch planks.

M. Belidor would have brick walls made under the floor, instead of beams, and a double floor laid on the cross-beams: which does not appear to be so well as the manner proposed here; the reader is, however, at liberty to choose the method he likes best.

To

To give light to the magazine, a window is made in each wing, which is ſhut up by two ſhutters of two or three inches thick, one within and the other without it; that which is on the outſide is covered with an iron plate, and is faſtened with bolts, as well as that on the inſide. Theſe windows are made very high, for fear of accidents, and are opened by means of a ladder, to give air to the magazine in fine dry weather.

There is likewiſe a double door made of ſtrong planks, the one opens on the outſide, and the other within; the outſide one is alſo covered with an iron plate, and both are locked by a ſtrong double lock; the ſtore-keeper has the key of the outſide, and the governor that of the inſide: the door ought to face the ſouth nearly, if poſſible; in order to render the magazine as light as can be, and that the wind blowing in may be dry and warm. Sometimes a wall of ten feet high is built round the magazine about twelve diſtant from it, to prevent any thing from approaching it without being ſeen. Mr. Muller has propoſed ſome alterations by way of improvement, in M. Vauban's conſtruction, for which ſee his Practical Fortification, p. 219, &c.

If large magazines are required, the piers or ſide-walls which ſupport the arch ſhould be ten feet thick, ſeventy-two feet long, and twenty-five feet high; the middle wall, which ſupports the two ſmall arches of the ground floor, eight feet high, and eighteen inches thick, and likewiſe the arches: the thickneſs of the great arch ſhould be three feet ſix inches, and the counterforts, as well as the air-holes, the ſame as before. Magazines of this kind ſhould not be erected in fortified towns, but in ſome inland part of the country near the capital, where no enemy is expected. It has been obſerved, that after the centres of ſemicircular arches are ſtruck, they ſettle at the crown and riſe up at the hanches; now as this ſhrinking of the arches muſt be attended with ill conſequences, by breaking the texture of the cement after it has been partly dried, and alſo by opening the joints of the vouſſoirs at one end; Dr. Hutton, in his Treatiſe on Bridges, has propoſed to remedy this inconvenience, with regard to bridges, by the arch of equilibration; and as the ill effect is much greater in powder magazines, he has alſo propoſed to find an arch of equilibration for them alſo; and to conſtruct it when the ſpan is twenty feet, the pitch or height ten, which are the ſame dimenſions as thoſe of the ſemicircle, the inclined exterior walls, at top, forming an angle of 113°, and the height of their angular point above the top of the arch equal to ſeven feet; this curious queſtion was anſwered in 1775, by the Rev. Mr. Wildbore, and the ſolution of it may be found in Hutton's Miſcellanea Mathematica.

Magazine, *Artillery*, or the magazine to a field battery, is uſually made about fifty or ſixty yards behind the platform. This is a cavity dug in the ground about four feet deep, and the earth thrown between the pit and the platform; the ſides of the pit are ſometimes planked round to keep it dry and to prevent the earth from crumbling in; and the powder-barrels placed here are covered with hurdles and earth, or tanned hides, to preſerve the powder from wet or fire. The communication to the magazine is by a ſloping trench beginning to deſcend about five or ſix yards behind the platform; and the earth is thrown on that ſide where it will moſt conveniently cover the perſons who remove the barrels of powder from the great magazine to the battery or ſmall magazine. When there are many cannons in the battery, and the ſervice is quick, it is cuſtomary to have, for every two pieces, a ſmall magazine to hold twenty or thirty barrels of powder; this is placed about fifteen or twenty yards behind the platform, and againſt the merlon between the cannon; and as theſe barrels are uſed, they are replaced by others from the great magazine. At each magazine a centinel is placed to prevent accidents; and in order to prevent perſons from coming into the battery and magazines who have no buſineſs there, a trench is ſometimes dug behind the magazine and carried into the trenches, which communicate between the magazine and battery.

Magazine, the apartment uſed to keep the powder in; which in large ſhips is ſituated forwards, and in ſmall ſhips abaft. It ſhould always be ſituated as low down as poſſible.

MAGBOTE, or Mægbote, formed of the Saxon *mæg*, *i. e. cognatus*, and *bote*, *compenſatio*, in our *Old Writers*, a compenſation for the ſlaying or murder of one's kinſman, in ancient times, when corporal puniſhments for murder, &c. were ſometimes commuted into pecuniary fines, if the friends and relations of the party were ſo ſatisfied.

MAGDALA, in *Ancient Geography*, a town of Paleſtine, on the weſtern bank of the lake Tiberias.

MAGDALEINE, in *Geography*, the name of an iſland ſituated at the bottom of Falſe bay, near the Cape of Good Hope, in which is a great reſort of ſea wolves, and of penguins, named "Manchots."

MAGDALEN. *Religious of St. Magdalen*, is a denomination given to divers communities of nuns, conſiſting, generally, of penitent courtezans; ſometimes, alſo, called *Magdalanettes*.

Such are thoſe at Metz, eſtabliſhed in 1452; thoſe at Paris, in 1492; thoſe at Naples, firſt eſtabliſhed in 1324; and endowed by queen Sancha, to ſerve as a retreat for public courtezans, who ſhould betake themſelves to repentance; and thoſe of Rouen and Bourdeaux, which had their original among thoſe of Paris in 1618.

In each of theſe monaſteries there are three kinds of perſons and congregations; the firſt conſiſt of thoſe who are admitted to make vows, and theſe bear the name of St. Magdalen; the congregation of St. Martha is the ſecond, and is compoſed of thoſe who it is not judged proper to admit to vows; finally, the congregation of St. Lazarus is compoſed of ſuch as are detained there by force.

The religious of St. Magdalen at Rome were eſtabliſhed by pope Leo X. Clement VIII. ſettled a revenue on them, and farther appointed that the effects of all public proſtitutes, dying inteſtate, ſhould fall to them; and that the teſtament of the reſt ſhould be invalid, unleſs they bequeathed a portion of their effects, which was to be at leaſt a fifth part, to them.

Magdalen *Hoſpital*. See Hospital.

Magdalen *Iſlands*, in *Geography*, a cluſter of iſlands in the gulf of St. Lawrence, N.E. of the iſle of St. John's, and N.W. of that of Cape Breton. They are inhabited by a few fiſhermen, and are dangerous to ſhips ſailing near them in foggy weather. The largeſt, which gives name to the cluſter, is ſituated in N. lat. 47° 25′. W. long. 61° 20′.

Magdalen *River*, a river of Canada, which runs into the river St. Lawrence. N. lat. 49° 12′. W. long. 65° 5′.

MAGDALENA, a ſmall iſland in the South Pacific ocean, being one of the *Marqueſas*; ſituated nearly in S. lat. 10° 29′. W. long. 138° 50′. See Marquesas.

Magdalena, a town of the iſland of Cuba; 30 miles S. of Havanna.

Magdalena *River*. See Madalena.

Magdalena, *Cape of*, a promontory in the centre of Canada, which has an iron mine abounding with ore and yielding excellent metal.

MAGDALEO, a word uſed by diſpenſatory writers, to expreſs any thing made up into a cylindrical form. The common rolls of plaſters which the apothecaries make up to be ready for ſpreading upon occaſion, are thus called, as alſo the rolls of ſulphur or common brimſtone.

MAGDALGAD, in *Ancient Geography*, a town of Paleſtine, in the tribe of Judah. Joſh. c. xv.

MAGDALLÆ, or MAGDALIDES, the ſame as Magdaleones, rolls of ſulphur, plaſter, &c.

MAGDALUM, in *Ancient Geography*, a place of Egypt, on the coaſt of the Red ſea, between Baal-Zephen and Phi-hahiroth.

MAGDEBURG, in *Geography*, a duchy ſurrounded by the Mark of Brandenburg, the duchy of Brunſwick, the principalities of Halberſtadt and Anholt, the county of Mansfeld, and the electorate of Saxony. The country belonging to this duchy is, in general, level. Although fuel is ſcarce, it has ſeveral mines of pit-coal, and by means of its rivers, particularly the Elbe, which pervades the duchy, obtains wood from the neighbouring provinces. Its ſalt ſprings afford a ſupply of ſalt ſufficient for the demands of all Germany. In 1703, the whole duchy contained 35 towns and 431 villages. From the years 1750 to 1756, the number of inhabitants, eſtimated by the burials, amounted to 330,000. According to Hoeck's account in 1801, the number is ſtated at 275,262. The ſtates of the country conſiſted of prelates, the nobility, and the cities. The Reformation was introduced into this duchy in the ſixteenth century, and about the middle of the ſucceeding century Lutheraniſm was the only religion that was tolerated; but ſince that time French and German Calviniſt refugees have been received, and under king Frederick-William, the private exerciſe of the Roman Catholic worſhip was tolerated both at Magdeburg and Halle. The biſhopric of Magdeburg was formed out of a Benedictine convent, founded by the emperor Otho I. in 937, and converted into an archbiſhopric in 967. By the peace of Weſtphalia, in 1648, the houſe of Brandenburg obtained, under certain ſtipulations, the reverſion of this archbiſhopric, and in 1680 the actual poſſeſſion of it. The duchy had its own regency, which, in 1714, was removed from Halle to Magdeburg, and conſiſted of two ſenates; but the cathedral chapter was afterwards excluded from any part in the government. The annual revenues amounted to above 800,000 rix-dollars. By the peace of Tilſit in 1807, that part of the duchy, which lies on the left ſide of the Elbe, was ceded by the king of Pruſſia to the new kingdom of Weſtphalia.

MAGDEBURG, a city of Weſtphalia, the capital of the above-mentioned province, in the circle of Lower Saxony, on the left bank of the Elbe. This was formerly one of the principal trading towns in Germany. It is ſtrongly fortified, and has a citadel on an iſland in the river Elbe. It is well built, and the cathedral ſquare is ornamented with large and elegant houſes. Among the principal edifices may be reckoned the king's palace, formerly the epiſcopal reſidence, the armoury, the governor's houſe, and the guildhall, to which we may add the Lutheran cathedral, which is a ſuperb ſtructure, in the antique taſte. The Lutherans have alſo three collegiate, and ſix parochial churches, and a convent. The manufactures, which are numerous, conſiſt of woollen cloths and ſtuffs, ſilk ſtuffs, cottons, linen, ſtockings, hats, leathern gloves, tobacco, ſnuff, &c. The ſituation of the Elbe, and the road connecting High and Low Germany, render it convenient for trade. Magdeburg, as early as the time of Charles the Great, was a place of ſome note; and it attained a conſiderable degree of proſperity in later times, and became one of the Hanſe towns. In the year 1807, it was taken by the French. The number of inhabitants, in 1798, is ſtated by Haſſel at 30,611, and in 1802, by Krug, at 32,000; 52 miles E.S.E. of Potzdam. N. lat. 52° 8′. E. long. 11° 50′.

MAGDELA, a town of Germany, in the principality of Weimar; 7 miles S.E. of Weimar.

MAGDELAINE, a cluſter of ſmall iſlands in the Mediterranean, near the N. coaſt of Sardinia. N. lat. 41° 11′. E. long. 9° 36′.

MAGDOLUS, or MAGDOL, in *Ancient Geography*, a town ſituated towards the middle of the frontiers of Lower Egypt, mentioned Jer. c. lxvi. v. 14. Exod. c. xiv. v. 2. and alſo by Herodotus l. xi. c. 49. It was not far from the ſea. The Itinerary of Antonine places it in the vicinity of the Delta, E. of it, about 12 miles from Peluſium, near the moſt eaſterly mouth of the Nile.

MAGEDAN, a town of Judea, ſituated E. of the lake of Genneſareth.

MAGEDO. See MEGIDDO.

MAGEE, in *Geography*, a town of Hindooſtan; 25 miles E. of Benares.

MAGEEYONCOLLA, a town of Burmah; 42 miles N. of Prome.

MAGEGODEVICK, or EASTERN RIVER, a river of America, which falls into the bay of Paſſamaquoddy, and ſuppoſed to be the true St. Croix, which forms part of the eaſt boundary line between the United States and New Brunſwick.

MAGEGOWN, a town of Hindooſtan, in Concan; 25 miles S. of Severndroog.

MAGELHOLM, a ſmall iſland of Denmark, in the Baltic, near the S. coaſt of the iſland of Zealand. N. lat. 54° 43′. E. long. 11° 17′.

MAGELLAN, STRAITS *of*, a paſſage between the Atlantic and Pacific oceans, at the ſouthern extremity of the continent of America; eſtimated by Bougainville at 342 miles from Cape Virgin Mary, in the Atlantic, S. lat. 52° 24′. W. long. 68° 22′, to Cape Pillar, in the Pacific, S. lat. 52° 45′. W. long. 75° 10′. The breadth of it is various in different parts; and it has many capes and bays, affording places of anchorage and ſecurity to ſhips that paſs through it. On the north it is bounded by Patagonia, and on the ſouth by Terra del Fuego. Theſe ſtraits were firſt diſcovered by Ferdinando Magellan, or Magalhaens, in the ſervice of the crown of Spain, who, in the year 1520, found a paſſage through them from the Atlantic to the Pacific ocean, (ſee his biographical article.) Admiral Drake alſo paſſed theſe ſtraits in his voyage round the world; and they have been ſince paſſed by ſeveral other navigators, *viz.* commodore Byron in 1764, Wallis in 1766, and Carteret in 1767, Bougainville in 1768, &c. They have been carefully examined by the navigators juſt mentioned, with regard to their bays, harbours, and headlands; the numerous iſlands which they contain, and the coaſts on both ſides, that incloſe them; and the tides, currents, and ſoundings that occur in them, through their whole extent. Of the tranſactions of Byron, Wallis, and Carteret in theſe ſtraits, we have details in the accounts of their reſpective voyages, and theſe, together with the chart, founded on their obſervations and diſcoveries, are a very valuable acceſſion to geography. Commodore Byron cloſes his account of the voyage through theſe ſtraits, with the following general remarks. "It is probable, that whoever ſhall read this account, of the difficulties and dangers which attended our paſſage through the ſtrait of Magellan, will conclude, that it ought never to be attempted again; but that all ſhips which ſhall hereafter ſail a weſtern courſe from Europe

Europe into the South seas, ought to go round Cape Horn. I, however, who have been twice round Cape Horn, am of a different opinion. I think that at a proper season of the year, not only a single vessel, but a large squadron might pass the strait in less than three weeks; and I think, to take the proper season, they should be at the eastern entrance some time in the month of December. One great advantage of this passage is, the facility with which fish is almost every where to be procured, with wild celery, scurvy grass, berries, and many other vegetables in great abundance; for to this I impute the healthiness of my ship's company, not a single man being affected with the scurvy in the slightest degree, nor upon the sick list for any other disorder, notwithstanding the hardship and labour which they endured in the passage, which cost us seven weeks and two days, as we entered the strait on Sunday the 17th of February, and quitted it on Tuesday the 9th of April. Wood and water are also to be procured almost at every anchoring place beyond Fresh-water bay. Our sufferings I impute wholly to our passing the strait just as the sun approached the equinox, when, in this high latitude, the worst weather was to be expected; and indeed the weather we had was dreadful, beyond all description." (Hawkesworth's Voyages, vol. i.) Capt. Wallis's account of his passage through this strait terminates with this reflection: "Thus we quitted a dreary and inhospitable region, where we were in almost perpetual danger of shipwreck for near four months, having entered the strait on the 17th of December 1766, and quitted it on the 11th of April 1767; a region where, in the midst of summer, the weather was cold, gloomy, and tempestuous, where the prospects had more the appearance of a chaos than of nature, and where, for the most part, the vallies were without herbage, and the hills without wood." To the account of captain Wallis's voyage is annexed, a table of the courses and distances from point to point, in this strait, as by compass.

MAGELLANIC Clouds, in *Astronomy*, whitish appearances like clouds, seen in the heavens towards the south pole, and having the same apparent motion as the stars.

They are three in number, two of them near each other. The largest lies far from the south pole, but the other two are not many degrees more remote from it than the nearest conspicuous star, that is, about eleven degrees. Mr. Boyle conjectures, that if these clouds were seen through a good telescope, they would appear to be multitudes of small stars like the milky way. Boyle's Works abr. vol. i. p. 295.

Magellanic *Goose*, *Anser magellanicus*, in *Ornithology*. See Duck.

MAGELLANICA Terra, in *Geography*. See Patagonia.

MAGERGONG, a town of Hindoostan, in Candeish; 54 miles S. of Indore.

MAGGERI, a town of Hindoostan, in Mysore; 21 miles W. of Bangalore.

MAGGEROE, a large island near the coast of Lapland, separated from it by a strait of the North sea, called "Magger Sund." This island is said to be the most northern land in Europe. N. lat. 71°. E. long. 24° 55'.

MAGGI, Jerome, in *Biography*, a lawyer, philologist, and engineer, was born at Anghiari, in Tuscany, in the earlier part of the sixteenth century; he studied at the principal Italian universities, and while young acquired an intimate acquaintance with antiquities and polite literature. He had scarcely attained to the age of manhood, when he was selected by his townsmen as their embassador at the court of Florence. In 1558, he was appointed judge at Amatrica, in the kingdom of Naples, but his usual residence was in the city of Venice, where he wrote the greater part of his learned works. Of his legal studies, the fruit was "A Commentary on the four Books of Justinian's Institutes." In general literature, his principal work was "Variarum Lectionum seu Miscellaneorum," which was elegantly written, and which proves him to have been thoroughly acquainted with the best ancient and modern authors. He appeared as a theologian, in a treatise "De Mundi exustione, et de Die Judicii," commended by Dupin for its learning and elegance. He gave signal proofs of his talents as a poet, but the work by which he acquired the greatest reputation, was relative to the subject of military engineering, entitled "Della Fortificazione delle Citta," which contains a description of many ingenious machines and instruments of his own invention. On account of his skill in this department of science, he was sent to Cyprus, when threatened with invasion by the Turks, and his services as an engineer were of great use in the celebrated siege of that place, and enabled it to hold out a long time, and with vast destruction to the enemy. At length it fell, and Maggi was carried by the Turks as a slave to Constantinople, where he underwent much hardship. In the gloomy solitude of a dungeon, he wrote two pieces, entitled "De Tintinnabulis," and "De Equuleo," the latter, "On the Rack," was probably suggested to him by the reflection on the tortures to which he was daily liable. He was at length, and at the moment when negociations were carrying on for his deliverance, strangled in his prison, in the year 1572. Bayle.

Maggi, Charles Maria, an Italian poet of the 17th century, and one of the restorers of good taste in Italy, after the barbarous ravages of the school of Marini. He was born at Milan in 1630, and was secretary to the senate of that city. He died in 1690, and his works were published in the following year by Muratori, at Milan, in four vols 12mo.

Maggi, in *Geography*, a town of Tunis; 40 miles S.W. of Gabbs.

MAGGIA Val, an Italian bailiwick, belonging to the Swiss cantons, containing 22 parishes, and 24,000 inhabitants of the Catholic religion. It is partly bounded by the duchy of Milan, and the bailiwicks of Livenen and Locarno, and terminated by mountains of eternal snow.—Also, a town of Italy, in the bailiwick of Bellinzona; seven miles W.S.W. from Bellinzona.—Also, a river of Italy, which runs into lake Maggiore, at Locarno.

MAGGIORA, Lago. See Lake.

MAGGIORE, an Italian adjective, from *major*, Lat. a word now naturalized in the English language, and synonymous with *greater*, as a *major* 3d implies a greater or sharp 3d, as a *minor* does a less or a flat 3d. These degrees of comparison are of very frequent use in music, the variable intervals amounting to five; as the semitone, the tone, the 3d, the 6th, and the 7th. With regard to the tone and the semitone, their difference of *major* and *minor* can only be expressed in numbers, as we have no notes to express them in our system. The semitone major is the interval of a second minor, as from B to C, or E to F, and its ratio is 15 to 16. The major is the difference between the 4th and 5th, and its ratio 8 to 9. The three other intervals, namely, the 3d, 6th, and 7th, differ constantly from each other by a semitone from the major to the minor. Thus, the 3d minor consists of a tone and a half, and the 3d major of two tones. There are some still smaller intervals, which are called major and minor in theory, as the quarter tone, and the comma; but as these intervals can only

only be expreffed in numbers, they are imaginary diftinctions, and ufelefs in practice.

A mode or key is alfo faid to be major, when the 3d above the key note is major; that is, confifting of four femitones above the bafe. To modulate from a major key to a minor, and *e contra*, are common mufical expreffions.

MAGGOT, the common name of the fly-worm, bred in flefh, from the egg of the great blue flefh-fly. Notwithftanding the diftafte for this animal, its figure and ftructure of parts are greatly worth attending to, and may ferve as a general hiftory of the clafs of worms produced from the eggs of flies.

This animal is white and flefhy; its body is compofed of a number of rings, like the bodies of caterpillars, and other the like infects, and is capable, at the pleafure of the animal, of affuming different figures, being at times more or lefs extended in length, and confequently more or lefs thick.

Notwithftanding that this creature has no legs, it is able to move itfelf very fwiftly, and, in its firft attempt to move its body, is extended to its greateft length, and affumes fomething of the figure of a pointed cone. The pointed part of this cone is the head of the animal, and is not feparated from the next ring by any deeper furrow than the reft of the rings are from one another. In fome ftates of the animal one may fee two fhort horns thruft out from the head; but what are more conftantly obfervable, are two brown fcaly hooks; thefe are, however, fometimes hid, and have each of them a fheath, or cafe, into which the animal can retract them at pleafure. Thefe hooks are bent into an arch, the concavity of which is toward the place on which the creature is placed, and they are thickeft at their infertion in the head, and thence diminifh gradually, till they terminate in a fine fharp point.

Thefe two hooks are placed in a parallel direction, and can never come together, and therefore cannot ferve in the place of teeth to grind the food between, but merely to pull and fever it to pieces, that it may be of a proper fize for the mouth of the creature.

The creature has, befides thefe two hooks, a kind of dart, which is of about a third part of their length, and is placed at an equal diftance between them. This alfo is brown like them, and fcaly; it is quite ftraight, and terminates in a fine point. The hooks have, as it were, two fcaly thorns at their points, and this dart feems intended, by reiterated ftrokes, to divide and break the pieces of flefh thefe have feparated from the reft, into fmaller parts.

Immediately below the apertures for the egrefs of the hooks, is placed the mouth of the animal; the creature does not fhew this little opening unlefs preffed; but if the preffure be properly managed, it will fufficiently open it, and there may be difcovered within it a fmall protuberance, which may very naturally be fuppofed either the tongue, or the fucker of the animal.

The hooks in this creature not only fupply the place of teeth but alfo of legs; fince it is by faftening thefe hooks into the fubftance it is placed on, and then drawing up its body to it, that it pulls itfelf along.

The back of the creature lowers itfelf by degrees as it approaches the extremity of the belly; and near the place where the back begins to lower itfelf, are placed the creature's two principal organs of refpiration. One may perceive there two fmall roundifh brown fpots: thefe are very eafily diftinguifhable by the naked eye; becaufe the reft of the body of the creature is white: but if we take in the affiftance of glaffes, each of thefe fpots appears to be a brown circular eminence raifed a little above the reft of the body. On each of thefe fpots one may alfo difcover three oblong oval cavities, fomething in the fhape of button-holes; thefe are fituated in a parallel direction to one another, and their length nearly in a perpendicular direction to that of the body of the animal.

Thefe apertures are fo many ftigmata or air-holes, openings deftined to admit the air neceffary to the life of the animal. The creature has fix of thefe ftigmata, three in each fide of its body.

The great tranfparence of the body of this infect, gives us an opportunity alfo to diftinguifh that it has on each fide a large white veffel running the whole length of the body. It is eafy to follow the courfe of thefe veffels through their whole length, but they are moft diftinct of all toward its hinder part, and they are always feen to terminate each in the brown fpot before defcribed; this leaves us no room to doubt but that they are the two principal tracheæ.

Thefe pofterior tracheæ have been well known to the later naturalifts; but there are two others befides thefe which they feem not to have diftinguifhed. Thefe are fituated in the anterior part of the animal, and are eafily difcovered by following the courfe of the tracheæ on each fide; for though thefe all the way diminifh in their diameters as they approach the head of the animal, yet it may be eafily enough feen where they terminate, which is (taking the head for one ring) in the junction of the fecond and third ring. In this place the naked eye eafily difcovers a fmall fpot at the extremity of each, which viewed with a good microfcope appears to be a plain ftigma, of the figure of a funnel with half of it cut off, and very elegantly indented, and as it were fringed at the edges.

Thefe ftigmata in the anterior part of the body, are as conftant in this creature as the pofterior ones, but it feems to have none of thofe which the caterpillar clafs are furnifhed with along their fides; though it feems from the ftructure of the fly it afterwards transforms itfelf into, that it ought to have them, fince that has ftigmata in their places.

The ramifications of the two great tracheæ are very beautifully feen in this creature, efpecially on his belly; and it is remarkable that no veffel analogous to the great artery in the caterpillar clafs can be difcovered in thefe; though, if there were any fuch, their great tranfparence muft needs make them very eafily diftinguifhable; nor could its dilatations and contractions, if fo confiderable as in that clafs of animals, be lefs fo. Malpighi imagined that artery, in the caterpillar clafs, a feries of hearts; in its place, however, there may be feen in thefe animals a true heart. It is eafy to obferve in thefe creatures, about the fourth ring of the body, a fmall flefhy part, which has alternate contractions and dilatations, and is not only difcoverable in the body by means of the creature's tranfparence; but, on making a proper fection of them in the fecond, third, and fourth rings, will be thrown out of the body of the creature, and will afterwards continue its beats for fome minutes. Reaumur's Hift. of Infects, vol. iv. p. 166, feq. See LARVA, PUPA, &c. under the article ENTOMOLOGY.

MAGHERA, in *Geography*, a poft-town of the county of Londonderry, Ireland; 96 miles N. from Dublin.

MAGHERAFELT a poft-town of the county of Londonderry, Ireland, near Lough Neagh; 88 miles N. from Dublin.

MAGHEREE, a clufter of iflands on the coaft of the county of Kerry, not far from Tralee bay.

MAGI, or MAGIANS, a title which the ancient Perfians gave to their wife men or philofophers.

The learned are in great perplexity about the original of the word *Magus*, μαγος. Plato, Xenophon, Herodotus, Strabo, &c. derived it from the Perfian language, in which it it ſignified a *prieſt*, or perſon appointed to officiate in holy things; as *Druid*, among the Gauls; *Gymnoſophiſt*, among the Indians; and *Levite*, among the Hebrews. Others derive it from the Greek μεγας, *great;* which they ſay, being borrowed of the Greeks by the Perſians, was returned in the form of μαγος; but Voſſius, with more probability, brings it from the Hebrew חגה, *haga, to meditate;* whence מחגים, *maaghim*, in Latin *meditabundi*, q. d. people addicted to meditation. See the ſequel of this article.

Magi, among the Perſians, anſwers to σοφοι, or φιλοσοφοι, among the Greeks; *ſapientes*, among the Latins; *Druids*, among the Gauls; *Gymnoſophiſts*, among the Indians; and *prophets, prieſts*, among the Egyptians.

The ancient Magi, according to Ariſtotle and Laertius, were the ſole authors and conſervators of the Perſian philoſophy; and the philoſophy principally cultivated among them, was theology and politics; they being always eſteemed as the interpreters of all law, both divine and human; on which account they were wonderfully revered by the people. Hence, Cicero obſerves, that none were admitted to the crown of Perſia, but ſuch as were well inſtructed in the diſcipline of the Magi; who taught τα βασιλικα, and ſhewed princes how to govern.

Plato, Apuleius, Laertius, and others, agree, that the philoſophy of the Magi related principally to the worſhip of the gods; they were the perſons who were to offer prayers, ſupplications, and ſacrifices, as if the gods would be heard by them alone.

They teach their doctrine concerning the nature and origin of the gods, ſays Laertius, whom they think to be fire, earth, and water; they reject the uſe of pictures and images, and reprobate the opinion, that the gods are male and female; they diſcourſe to the people concerning juſtice; they think it impious to conſume dead bodies with fire: they allow of marriage between mother and ſon; they practiſe divination and prophecy, pretending that the gods appear to them; they forbid the uſe of ornaments in dreſs; they clothe themſelves in a white robe; they make uſe of the ground as their bed, of herbs, cheeſe, and bread for food, and of a reed for their ſtaff. Strabo alſo relates, that there were in Cappadocia a great number of Magi, who were called "Pyrethi," or worſhippers of fire, and many temples of the Perſian gods, in the midſt of which were altars attended by prieſts, who daily renewed the ſacred fire, accompanying the ceremony with muſic.

But according to Lucian, Suidas, &c. this theology or worſhip of the gods, as it is called, about which the Magi were employed, was little more than the diabolical art of divination; ſo that μαγεια, ſtrictly taken, was the art of divination. Theſe people were held in ſuch veneration among the Perſians, that Darius, the ſon of Hyſtaſpes, among other things, had it engraven on his monument, that he was the maſter of the Magi.

Philo Judæus deſcribes the Magi to be diligent inquirers into nature, out of the love they bear to truth; and who, ſetting themſelves apart from other things, contemplate the divine virtues the more clearly, and initiate others in the ſame myſteries.

The Magi, or Magians, formed one of the two grand ſects into which the idolatry of the world was divided between 5 and 600 years before Chriſt. Theſe abominated all thoſe images which were worſhipped by the other ſect, denominated Sabians, and paid their worſhip to the Deity under the emblem of fire. Their chief doctrine was, that there were two principles, one of which was the cauſe of all good, and the other the cauſe of all evil. The former was repreſented by light, and the latter by darkneſs, as their trueſt ſymbols; and of the compoſition of theſe two, they ſuppoſed, that all things in the world were made. The good god they called Yazdan, denominated by the Greeks Oromaſdes; and the evil god Ahraman, whom the Greeks called Arimanius. (See ARIMANIUS.) Concerning theſe two gods, there was this difference of opinion among them; that whereas ſome held both of them to have been from all eternity, there were others who contended, that the good god only was eternal, and that the other was created. But they both agreed in this, that there will be a continual oppoſition between theſe two, till the end of the world; when the former ſhall overcome the latter; and that from thenceforth each of them ſhall have his world to himſelf; that is, the good god ſhall have his world with all good men with him; and the evil god his world, with all evil men with him. The good god they always worſhipped before fire, as being the cauſe of light, and eſpecially before the ſun, as being, in their opinion, the moſt perfect fire, and cauſing the moſt perfect light; and for this reaſon they had in all their temples fire continually burning on altars, erected in them for that purpoſe. Before theſe ſacred fires they performed all their public acts of devotion, as they likewiſe practiſed their private devotions before their private fires in their own houſes. Such were the tenets of this ſect, when Smerdis, who was the principal leader of it, having uſurped the crown after the death of Cambyſes, was ſlain by ſeven princes of Perſia; and many of the Magians, who adhered to him, ſhared likewiſe the ſame fate. In conſequence of this event, thoſe who adopted the ſentiments of this ſect, were called, by way of deriſion, Magians, from *mige-guſh*, which ſignified, in the language of the country then in uſe, *one that had his ears cropped*. The whole ſect of the Magians would ſoon have ſunk into utter extinction, if it had not, in a few years after this period, been revived and reformed by Zoroaſter. This celebrated philoſopher, called by the Perſians Zerduſht, or Zaratuſh, began about the thirty-ſixth year of the reign of Darius to reſtore and reform the Magian ſyſtem of religion. He was not only excellently ſkilled in all the learning of the Eaſt that prevailed in his time; but likewiſe thoroughly verſed in the Jewiſh religion, and in all the ſacred writings of the Old Teſtament that were then extant, whence ſome have inferred, that he was a native Jew both by birth and profeſſion; and that he had been ſervant to one of the prophets, probably Ezekiel or Daniel. (See ZOROASTER.) He made his firſt appearance in Media, in the city of Xiz, now called Aderbijan, as ſome ſay; or according to others, in Ecbatana, now called Tauris. Inſtead of admitting the exiſtence of two firſt cauſes, with the Magians, he introduced a principle ſuperior to them both, one ſupreme God, who created both theſe, and out of theſe two produced, according to his ſovereign pleaſure, every thing elſe. See Iſaiah, v. 5, 6, 7.

In order to avoid making God the author of all evil, he taught that God originally created only light or good, and that darkneſs or evil followed it by conſequence, as the ſhadow doth the perſon. According to his doctrine, there was one ſupreme being independently, and ſelf-exiſting from all eternity: under him there were two angels, one the angel of light, the author and director of all good; and the other the angel of darkneſs, who is the author and director of all evil: theſe two, out of the mixture of light and darkneſs, made all things that are; and they are in a ſtate of perpetual conflict; ſo that where the angel of light prevails, there the moſt is good; and where the angel of darkneſs darknefs prevails, there the moft is evil: this ftruggle fhall continue to the end of the world; and then there fhall be a general refurrection, and a day of judgment; after which, the angel of darknefs and his difciples fhall go into a world of their own, where they fhall fuffer in everlafting darknefs the punifhment of their evil deeds; and the angel of light and his difciples fhall go into a world of their own, where they fhall receive in everlafting light, the reward due unto their good deeds: and henceforward they fhall for ever remain feparate. See EMANATION.

Plutarch, fpeaking of the improvement of the religious fyftem of the Magi by Zoroafter, fays, (Ifis et Ofiris, tom. ii. p. 155) "fome maintain, that, neither is the world governed by blind chance without intelligence, nor is there one mind alone at the head of the univerfe; but, fince good and evil are blended, and nature produces nothing unmixed, we are to conceive, not that there is one ftore-keeper, who, after the manner of an hoft, difpenfes adulterated liquors to his guefts; but that there are in nature two oppofite powers, counteracting each other's operations, the one accomplifhing good defigns, the other evil. To the better power Zoroafter gave the name of Oromaldes, to the worfe that of Arimanius; and affirmed, that, of fenfible objects, the former moft refembled light, the latter darknefs. He alfo taught, that Mithras was a divinity, who acted as moderator between them, whence he was called by the Perfians the Mediator." After relating feveral fabulous tales concerning the contefts between the good and evil dæmons, Plutarch, ftill reciting the doctrines of Zoroafter, proceeds, "The fated time is approaching, in which Arimanius himfelf fhall be utterly deftroyed; in which the furface of the earth fhall become a perfect plain, and all men fhall fpeak one language, and live happily together in one fociety." He adds, on the authority of Theopompus, "It is the opinion of the Magi, that each of thefe gods fhall fubdue and be fubdued by turns for 6000 years, but that, at laft, the evil principle fhall perifh, and men fhall live in happinefs; neither needing food, nor yielding a fhadow; the God who directs thefe things taking his repofe for a time, which, though it may feem long to man, is but fhort." Diogenes Laertius, after Hecateus, gives it as the doctrine of Zoroafter, that the gods (meaning, doubtlefs, thofe of whom he laft fpeaks, Oromafdes and Arimanius) were derived beings.

Thofe who remain of this fect in Perfia and India, in the prefent day, retain the fame doctrines. Zoroafter alfo caufed fire temples to be erected wherever he came: for having feigned that he was taken up into heaven, and there inftructed in the doctrines he taught by God himfelf, out of the midft of a great and moft bright flame of fire, he taught his followers, that fire was the trueft fhechinah of the divine prefence; that the fun being the moft perfect fire, God had there the throne of his glory, and the refidence of his divine prefence in a peculiar manner; and next to this in our elementary fire: and, therefore, he ordered them to direct all their worfhip to God, firft towards the fun, which they called Mithra, and next towards their facred fires: and when they came before thefe fires to worfhip, they always approached them on the weft fide, that having their faces towards them, and alfo towards the rifing fun at the fame time, they might direct their worfhip towards both. And in this pofture they always performed every act of their worfhip. Zoroafter alfo pretended, that he brought fome of the heavenly fire with him on his return, and placed it on the altar of the firft fire-temple, which he erected at Xiz, in Media, whence it was propagated to all the reft. And on this account, their priefts carefully watch it, and never fuffer it to be extinguifhed.

Zoroafter, having affumed the character of a divine prophet and reformer of religion, retired into a cave, devoting himfelf to prayer and meditation, where he compofed the book called the *Zend*, in which his pretended revelations were contained. From Media he removed into Bactria; and he went alfo into India among the Brachmans, and having acquired all their knowledge in mathematics, philofophy, and aftronomy, returned and communicated the knowledge he had acquired to his Magians; and thus they became famous for their fkill in thefe fciences; fo that a learned man and a Magian were equivalent terms. The vulgar conceived of them as perfons actuated and infpired by fupernatural powers; and hence thofe, who pretended to wicked and diabolical acts, affumed the name of Magians; and the term magician acquired its evil meaning. However, this diftinguifhed knowledge was confined to thofe, who were by way of eminence, the Magi, or the priefts; who, like thofe of the Jews, being of the fame tribe, appropriated their learning to their own families. Thefe priefts were diftributed into three orders, *viz.* the inferior priefts, who conducted the ordinary ceremonies of religion; the fuperintendants, who governed them, and prefided over the facred fire; and the archimagus, or high-prieft, who poffeffed fupreme authority over the whole order; and their churches or temples were alfo of three forts, parochial or oratories, in which the people performed their devotions, and where the facred fire was kept only in lamps; fire-temples, in which fire was kept continually burning on a facred altar, where the higher order of the Magi directed the public devotions, and the people affembled to perform magical incantations, hear interpretations of dreams, and practife other fuperftitions; and laftly, the fire-temple in which the archimagus refided, which was vifited by the people at certain feafons with peculiar folemnity, and to which it was deemed an indifpenfible duty for every one to repair, at leaft once in his life. Zoroafter at length carried his religious fyftem to the royal court of Sufa, and made Darius a profelyte, together with moft of the great men of the kingdom. Darius was fo attached to the Magian fyftem, that he became an archimagus, and ordered, that, among other titles, it fhould be engraven on his monument, that he was *mafter of the Magians*. Hence the kings of Perfia were confidered as pertaining to the facerdotal tribe, and were always initiated in the facred order of the Magians, before they took on them the crown, or were inaugurated into the kingdom.

No images or ftatues were permitted in the Perfian worfhip. Hence, when Xerxes found idols in the Grecian temples, he, by the advice of the Magi, fet them on fire, faying, that the gods, to whom all things are open, are not to be confined within the walls of a temple.

Zoroafter, after this fuccefs, returned to Balch, in Bactria, where, according to his own inftitution, he was obliged to refide, as archimagus or head of the fect, and there he reigned in fpirituals, with the fame authority, over the whole empire, as the king did in temporals; and from hence probably arofe the miftake of making him king of Bactria. The principal temple erected at Balch by Zoroafter remained till the 7th century, when his followers being driven by the Mahometans into Carmenia, another building of the fame kind was raifed, to which thofe who adhered to the ancient Perfian religion reforted. Zoroafter, at length, fell a facrifice to his zeal; for having concerted an enterprize againft Argafp, king of of the oriental Scythians, who was a zealous Sabian, to draw him over to his religion; the Scythian prince invaded Bactria with an army, and slew Zoroaster, with all the priests of this patriarchal church, to the number of eighty persons, and demolished all the fire-temples in that province. This is said to have happened in the 35th year of Darius. Pythagoras derived a great part of his knowledge from Zoroaster, and his disciples the Magians. Prideaux's Conn. vol. i.

Their descendants, the modern Magi, or fire-worshippers, are divided into three classes; of which the first and most learned neither eat nor kill animals; but adhere to the old institution of abstaining from all living creatures. The Magi of the second class refrain only from tame animals; nor do the last kill all indifferently, it being the firm and distinguishing settled notion of them all, την μετεμψυχωσιν ειναι, *that there is a transmigration of souls*. See METEMPSYCHOSIS and GABRES.

The ancient Arabians, like the neighbouring Chaldæans and Persians, seem to have had their wise men, by whom their knowledge, such as they had, was taught, and their religious ceremonies and superstitious arts were practised. Pliny (Hist. Nat. l. xxx. c. 1.) mentions the Arabian Magi, and speaks of Hippocus, an Arabian, as belonging to this order. One of the most ancient sects of the Magi, as the Mosaic history informs us (Exod. iv.), was among the Egyptians. These Magi made use of small images, of various forms, with which they pretended to perform many wonders, and particularly to cure diseases.

MAGIC, MAGIA, Μαγεια, in its ancient sense, the science, or discipline and doctrine, of the Magi, or wise men of Persia.

The magic which Zoroaster invented was probably nothing more than the performance of certain religious ceremonies, by means of which, good dæmons were supposed to be prevailed upon to communicate supernatural properties and powers to herbs, stones, and other natural bodies, or to afford assistance in other miraculous ways to those who invoked them. In war, it was supposed, that, by the help of magic, the forces of an enemy might be routed, or an army struck with a general panic, as is said to have happened to Ninus, in his war with the Bactrians. In this art the kings of Chaldæa and Persia were instructed, as one of the most useful instruments of government, among a people, whose ignorance and credulity rendered them proper subjects of imposture. For it is justly observed by Plutarch (in Sertorio), that "barbarous nations are naturally prone to superstition; and a weak, illiterate, and fickle multitude, when they are once brought under its dominion, will be more obedient to their priests than to their civil or military leaders." We have given some account of it under the article CHALDÆANS.

The Chaldæans, as we are informed by Diodorus Siculus (lib. i.) learned the art of astrology and magic from the Egyptians, who were, from the earliest times, adepts in these fictitious sciences, and by the cultivation of these arts, their priests acquired an irresistible sway over an ignorant and superstitious populace. See the preceding article.

MAGIC, in a more modern sense, is a science which teaches to perform wonderful and surprising effects.

The word magic originally carried with it a very innocent, nay, a very laudable, meaning; being used purely to signify the study of wisdom, and the more sublime parts of knowledge; but in regard the ancient Magi engaged themselves in astrology, divination, sorcery, &c. the term magic, in time, became odious, and was only used to signify an unlawful and diabolical kind of science, depending, as it was pretended, on the assistance of the devil, and departed souls.

If any wonder how so vain and deceitful a science should gain so much credit and authority over men's minds, Pliny gives the reason of it. It is, says he, because it has possessed itself of three sciences of the most esteem among men, taking from each all that is great and marvellous in it. Nobody doubts but it had its origin in medicine, and that it insinuated itself into the minds of the people, under pretence of affording extraordinary remedies. To these fine promises is added every thing in religion that is pompous and splendid, and that appears calculated to blind and captivate mankind. And, lastly, it mingled judicial astrology with the rest, persuading people, curious of futurity, that it saw every thing to come in the heavens. Agrippa divides magic into three kinds, *natural*, *celestial*, and *ceremonial* or *superstitious*.

MAGIC, *Natural*, is no more than the application of natural active causes to passive things or subjects; by means of which many surprising, but yet natural, effects are produced.

MAGIC, *Celestial*, borders nearly on judiciary astrology; it attributes to spirits a kind of rule, or dominion, over the planets: and to the planets a dominion over men; and on those principles, builds a ridiculous kind of system.

MAGIC, *Superstitious*, or *Geotic*, consists in the invocation of devils, or dæmons: its effects are usually evil and wicked, though very strange, and seemingly surpassing the powers of nature: they are supposed to be produced by virtue of some compact, either tacit or express, with evil spirits; but the truth is, these supposed compacts have not the power that is usually imagined; nor do they produce half those effects ordinarily ascribed to them.

MAGIC *Lantern*, an optic machine contrived by Kircher, (see his Ars Magna Lucis et Umbræ, p. 768, 769.), by means of which little coloured images are represented on an opposite wall of a dark room, magnified to any bigness at pleasure, and exhibited in their natural and vivid colours.

MAGIC *Lantern*, *Construction of the*. Suppose A B C D (*Plate* X. *Optics*, *fig.* 1.) a common tin lantern, to which is added a tube to draw out, F G. In H is fixed a metallic concave speculum, of a foot diameter at most, or four inches at least: or, in lieu thereof, near the extremity of the tube, there must be placed a convex lens, consisting of a segment of a small sphere, its diameter not exceeding a few inches. The use of this lens is to throw a strong light upon the image; and sometimes a concave speculum is used with the lens, in order to make the image still more vivid. In the focus of the concave speculum, or lens, is placed a lamp L; within the tube where it is soldered to the side of the lantern, is placed a small lens, convex on both sides, being a portion of a small sphere, having its focus about the distance of three inches. The extreme part of the tube, F M, is square, and has an aperture quite through, so as to receive an oblong frame, N O, passed into it; in this frame are round holes, an inch or two in diameter. According to the bigness of these holes are drawn circles, on a plain thin glass; and in these circles are painted any figures or images, at pleasure, with transparent water colours. These images, fitted into the frame, and placed invertedly, at a little distance from the focus of the lens I, will be projected on an opposite white wall of a dark room, prodigiously magnified in all their colours, and in an erect situation. By having the instrument so contrived, as that the lens, I, may move in a slide, the focus may be made, and consequently the image appear distinct, at almost any distance.

Or thus:—Every thing being managed as in the former, into the sliding tube, F G, insert another convex lens K, the segment of a sphere somewhat larger than I. Now, if the picture be brought nearer to I than the distance of the focus, diverging rays will be propagated, as if they proceeded from the object; wherefore, if the lens, K, be so placed,

placed, as that the object is very near its focus, the image will be exhibited on the wall, exceedingly magnified.

MAGIC *Lantern, Theory of the.* The lamp being placed in the focus of the concave ſpeculum, or any convex glaſs, the rays will be propagated parallel to each other, and the image will be ſtrongly illumined, and will therefore emit a great number of rays upon the lens I. But, being ſuppoſed to be placed near the lens I, the inverted image of the picture inverted muſt be formed on the oppoſite wall, exceedingly magnified, after its refraction through the lens; and it will be ſtill the more magnified, as the lens is a ſegment of a leſs ſphere, and as the picture is placed nearer the focus of the lens; in a dark place, therefore, the picture will be repreſented prodigiouſly large and extremely vivid.

To heighten the light, ſpecula are preferred to lenſes; the focus of a ſpeculum being nearer than that of a lens. De Chales orders the diameter of the lens, I, to be two, four, or five digits, and in a ſubduple proportion to the other K; *i. e.* if I be five digits, K muſt be ten; and the diameter of the ſpeculum, according to the ſame, is to be two digits. Zahnius chooſes to have the diameter of I $\frac{9}{10}$ of a foot; and that of K one foot and a half, &c.

Little animals being included in the magic lantern, in the manner obſerved in ſpeaking of the microſcope, or any little tranſparent objects faſtened to a ſlice of talc or glaſs, and ſubſtituted inſtead of images, the magic lantern will become a microſcope.

A view of the inſtrument itſelf may be ſeen in *fig.* 2, in which *b h c* is the lens that throws the light of the candle or lamp, *a*, on the object *d e*, and *k l* is the lens that magnifies the image, *f g*, on the white wall, F H, in a dark room. It is plain, that if the tube, *b n k l m c*, be contracted, and the glaſs, *k l*, be brought nearer the object *d e*, the image, *f g*, will be enlarged; and hence, this lantern has been called the *lanterna megalographica*. On the contrary, if the tube be protracted, the image of the object will be diminiſhed. In ſome magic lanterns, inſtead of the ſingle lens *k l*, two lenſes are uſed of leſs curvature, and ſet at a little diſtance from each other; and theſe produce a ſomewhat better effect than a ſingle lens. Between them is placed a perforated diaphragm.

M. Euler propoſed a ſcheme to introduce viſion by reflected light into the magic lantern, as well as the ſolar microſcope, by which many inconveniences to which thoſe inſtruments are ſubject, might be avoided. For this purpoſe, he ſays, that nothing is neceſſary but a large concave mirror, perforated as for a teleſcope, and that the light be ſo ſituated, that none of it may paſs directly through the perforation, ſo as to fall on the images of the objects upon the ſcreen. He propoſes to have four different machines for objects of different ſizes; the firſt for thoſe of ſix feet long, the ſecond for thoſe of one foot, the third for thoſe of two inches, and the fourth for thoſe of two lines. An idea of this contrivance is given in *fig.* 3, in which O D repreſents the concave mirror, E the object, *l, l*, the lights, and A the lens, through which the rays are tranſmitted to the ſcreen. Nov. Com. Petrop. vol. iii. p. 363.

MAGIC *Square*, a ſquare figure, formed of a ſeries of numbers, in mathematical proportion, ſo diſpoſed in parallel and equal ranks, as that the ſums of each row, taken either perpendicularly, horizontally, or diagonally, are equal.

The ſeveral numbers which compoſe any ſquare number (for inſtance, 1, 2, 3, 4, 5, &c. to 25 incluſive, which compoſe the ſquare number 25), being diſpoſed after each other, in a ſquare figure of 25 cells, each in its cell; if then you change the order of theſe numbers, and diſpoſe them in the cells in ſuch a manner, as that the five numbers which fill an horizontal rank of cells, being added together, ſhall make the ſame ſum with the five numbers in any other rank of cells, whether horizontal or vertical, and even the ſame number with the five in each of the two diagonal ranks: this diſpoſition of numbers is called a *magic* ſquare; in oppoſition to the former diſpoſition, which is called a *natural* ſquare. See the figure following.

Natural Square.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

Magic Square.

16	14	8	2	25
3	22	20	11	9
15	6	4	23	17
24	18	12	10	1
7	5	21	19	13

One would imagine, that theſe magic ſquares had that name given them, becauſe this property of all their ranks, which, taken any way, make always the ſame ſum, appeared extremely ſurpriſing, eſpecially in certain ignorant ages, when mathematics paſſed for magic; but there is a great deal of reaſon to ſuſpect, that theſe ſquares merited their name ſtill farther, by the ſuperſtitious operations they were employed in, as the conſtruction of taliſmans, &c. for, according to the childiſh philoſophy of thoſe days, which attributed virtues to numbers, what virtues might not be expected from numbers ſo wonderful?

However, what was at firſt the vain practice of makers of taliſmans and conjurers, has ſince become the ſubject of ſerious reſearch among mathematicians; not that they imagine it will lead them to any thing of ſolid uſe or advantage. Magic ſquares favour too much of their original to be of much uſe; but only as it is a kind of play, where the difficulty makes the merit, and it may chance to produce ſome new views of numbers, which mathematicians will not loſe the occaſion of.

Eman. Moſchopulus, a Greek author of no great antiquity, is the firſt that appears to have ſpoken of magic ſquares: and, by the age in which he lived, there is reaſon to imagine he did not look on them merely as a mathematician. However, he has left us ſome rules for their conſtruction. In the treatiſe of Corn. Agrippa, ſo much accuſed of magic, we find the ſquares of ſeven numbers, *viz.* from three to nine incluſive, diſpoſed magically; and it muſt not be ſuppoſed that thoſe ſeven numbers were preferred to all the other without ſome very good reaſon: in effect, it is becauſe their ſquares, according to the ſyſtem of Agrippa and his followers, are planetary. The ſquare of 3, for inſtance, belongs to Saturn; that of 4, to Jupiter; that of 5, to Mars; that of 6, to the Sun; that of 7, to Venus; that of 8, to Mercury; and that of 9, to the Moon. M. Bachet applied himſelf to the ſtudy of magic ſquares, on the hint he had taken from the planetary ſquares of Agrippa, as being unacquainted with the work of Moſchopulus, which is only in manuſcript in the French king's library; and, without the aſſiſtance of any author, he found out a new method for thoſe ſquares whoſe root is uneven; for inſtance, 25, 49, &c. but he could not make any thing of thoſe whoſe root is even.

After him came M. Frenicle, who took the ſame ſubject in hand. A certain great algebraiſt was of opinion, that whereas the ſixteen numbers which compoſe the ſquare might

 be

be disposed 20922789888000 different ways in a natural square (as from the rules of combination it is certain they may), they could not be disposed in a magic square above sixteen different ways; but M. Frenicle shewed, that they might be thus disposed 878 different ways: whence it appears how much his method exceeds the former, which only yielded the 55th part of magic squares of that of M. Frenicle.

To this inquiry he thought fit to add a difficulty, that had not yet been considered; the magic square of 7, for instance, being constructed, and its 49 cells filled, if the two horizontal ranks of cells, and, at the same time, the two vertical ones, the most remote from the middle, be retrenched, that is, if the whole border or circumference of the square be taken away, there will remain a square, whose root will be 5, and which will only consist of 25 cells. Now, it is not at all surprising, that the square should be no longer magical, because the ranks of the large ones were not intended to make the same sum, excepting when taken entire with all the seven numbers that fill their seven cells; so that being mutilated each of two cells, and having lost two of their numbers, it may be well expected, that their remainders will not any longer make the same sum. But M. Frenicle would not be satisfied unless when the circumference or border of the magic square was taken away, and even any circumference at pleasure, or, in fine, several circumferences at once, the remaining squares were still magical: which last condition, no doubt, made these squares vastly more magical than ever.

Again, he inverted that condition, and required that any circumference taken at pleasure, or even several circumferences, should be inseparable from the square; that is, that it should cease to be magical when they were removed, and yet continue magical after the removal of any of the rest. M. Frenicle, however, gives no general demonstration of his methods, and frequently seems to have no other guide but chance. It is true, his book was not published by himself, nor did it appear till after his death, *viz.* in 1693.

In 1703, M. Poignard, canon of Brussels, published a treatise of sublime magic squares. Before him there had been no magic squares made but for serieses of natural numbers that formed a square; but M. Poignard made two very considerable improvements. 1°. Instead of taking all the numbers that fill a square, for instance, the thirty-six successive numbers, which would fill all the cells of a natural square, whose side is six, he only takes as many successive numbers as there are units in the side of the square, which, in this case, are six; and these six numbers alone he disposes in such manner in the thirty-six cells, that none of them are repeated twice in the same rank, whether it be horizontal, vertical, or diagonal; whence it follows, that all the ranks, taken all the ways possible, must always make the same sum, which M. Poignard calls repeated progression. 2°. Instead of being confined to take these numbers according to the series and succession of the natural numbers, that is, in an arithmetical progression, he takes them likewise in a geometrical progression, and even in an harmonical progression. But with these two last progressions the magic must necessarily be different to what it was: in the squares filled with numbers in geometrical progression, it consists in this, that the products of all the ranks are equal; and, in the harmonical progression, the numbers of all the ranks continually follow that progression: he makes squares of each of these three progressions repeated.

This book of M. Poignard gave occasion to Mr. de la Hire to turn his thoughts the same way, which he did with such success, that he seems to have well-nigh completed the theory of magic squares. He first considers uneven squares; all his predecessors on the subject having found the construction of even ones by much the most difficult; for which reason M. de la Hire reserves those for the last. This excess of difficulty may arise partly from hence, that the numbers are taken in arithmetical progression. Now in that progression, if the number of terms be uneven, that in the middle has some properties which may be of service; for instance, being multiplied by the number of terms in the progression, the product is equal to the sum of all the terms.

M. de la Hire proposes a general method for uneven squares, which has some similitude with the theory of compound motions, so useful and fertile in mechanics. As that consists in decompounding motions, and resolving them into others more simple; so does M. de la Hire's method consist in resolving the square that is to be constructed into two simple and primitive squares. It must be owned, however, it is not quite so easy to conceive those two simple and primitive squares in the compound or perfect square, as in an oblique motion to imagine a parallel and perpendicular one.

Suppose a square of cells, whose root is uneven, for instance 7; and that its forty-nine cells are to be filled magically with numbers, for instance, the first 7. M. de la Hire, on the one side, takes the first seven numbers, beginning with unity, and ending with the root 7; and on the other 7, and all its multiples to 49, exclusively; and as these only make six numbers, he adds 0, which makes this an arithmetical progression of seven terms, as well as the other; 0, 7, 14, 21, 28, 35, 42. This done, with the first progression repeated, he fills the square of the root 7 magically: in order to this, he writes in the first seven cells of the first horizontal rank, the seven numbers proposed, in what order he pleases, for that is absolutely indifferent; and it is proper to observe here, that those seven numbers may be ranged in 5040 different manners in the same rank. The order in which they are placed in the first horizontal rank, be it what it will, is that which determines their order in all the rest. For the second horizontal rank, he places in its first cell, either the third, the fourth, the fifth, or the sixth number, from the first number of the first rank; and after that writes the six others in order as they follow. For the third horizontal rank, he observes the same method with regard to the second, that he observed in the second with regard to the first, and so of the rest. For instance, suppose the first horizontal rank filled with the seven numbers in their natural order, 1, 2, 3, 4, 5, 6, 7; the second horizontal rank may either commence with 3, with 4, with 5, or with 6; but in this instance it commences with 3; the third rank therefore must commence with 5, the fourth with 7, the fifth with 2, the sixth with 4, and the seventh with 6. The commencement of the ranks which follow the first being thus determined, the other numbers, as we have already observed, must be written down in the order wherein they stand in the first, going on to 5, 6, and 7, and returning to 1, 2, &c. till every

1	2	3	4	5	6	7
3	4	5	6	7	1	2
5	6	7	1	2	3	4
7	1	2	3	4	5	6
2	3	4	5	6	7	2
4	5	6	7	1	2	3
6	7	1	2	3	4	5

every number in the firſt rank be found in every rank underneath, according to the order arbitrarily pitched upon at firſt. By this means it is evident, that no number whatever can be repeated twice in the ſame rank; and by conſequence, that the ſeven numbers 1, 2, 3, 4, 5, 6, 7, being in each rank, muſt of neceſſity make the ſame ſum.

It appears, from this example, that the arrangement of the numbers in the firſt rank being choſen at pleaſure, the other ranks may be continued in four different manners: and ſince the firſt rank may have 5040 different arrangements, there are no leſs than 20,160 different manners of conſtructing the magic ſquare of ſeven numbers repeated.

1	2	3	4	5	6	7
2	3	4	5	6	7	1
3	4	5	6	7	1	2
4	5	6	7	1	2	3
5	6	7	1	2	3	4
6	7	1	2	3	4	5
7	1	2	3	4	5	6

1	2	3	4	5	6	7
7	1	2	3	4	5	6
6	7	1	2	3	4	5
5	6	7	1	2	3	4
4	5	6	7	1	2	3
3	4	5	6	7	1	2
2	3	4	5	6	7	1

The order of the numbers in the firſt rank being determined; if in beginning with the ſecond rank, the ſecond number 2, or the laſt number 7, ſhould be pitched upon, in one of thoſe caſes and repeated; and, in the other caſe, the other diagonal would be falſe, unleſs the number repeated ſeven times ſhould happen to be 4; for four times ſeven is equal to the ſum of 1, 2, 3, 4, 5, 6, 7: and, in general, in every ſquare conſiſting of an unequal number of terms, in arithmetical progreſſion, one of the diagonals would be falſe according to thoſe two conſtructions, unleſs the term always repeated in that diagonal were the middle term of the progreſſion. It is not, however, at all neceſſary to take the terms in an arithmetical progreſſion; for, according to this method, one may conſtruct a magic ſquare of any numbers at pleaſure, whether they be according to any certain progreſſion, or not. If they be in an arithmetical progreſſion, it will be proper, out of the general method, to except thoſe two conſtructions, which produce a continual repetition of the ſame term, in one of the two diagonals; and only to take in the caſe, wherein that repetition would prevent the diagonal from being juſt: which caſe being abſolutely diſregarded, when we computed, that the ſquare of 7 might have 20,160 different conſtructions; it is evident, that by taking that caſe in, it muſt have vaſtly more.

To begin the ſecond rank with any other number beſides the ſecond and the laſt, muſt not, however, be looked on as an univerſal rule: it holds good for the ſquare of 7; but if the ſquare of 9, for inſtance, were to be conſtructed, and the fourth figure of the firſt horizontal rank were pitched on for the firſt of the ſecond, the conſequence would be, that the fifth and eighth horizontal ranks would likewiſe commence with the ſame number, which would therefore be repeated three times in the ſame vertical rank, and occaſion other repetitions in all the reſt. The general rule, therefore, muſt be conceived thus: let the number in the firſt rank pitched on, for the commencement of the ſecond, have ſuch an exponent of its quota, that is, let the order of its place be ſuch, as that if an unit be taken from it, the remainder will not be any juſt quota part of the root of the ſquare; that is, cannot divide it equally. If, for example, in the ſquare of 7, the third number of the firſt horizontal rank be pitched on for the firſt of the ſecond, ſuch conſtruction will be juſt; becauſe the exponent of the place of that number, *viz.* 3, ſubtracting 1, that is, 2 cannot divide 7. Thus alſo might the fourth number of the ſame firſt rank be choſen, becauſe 4 — 1, *viz.* 3, cannot divide 7; and, for the ſame reaſon, the fifth or ſixth number might be taken: but in the ſquare of 9, the fourth number of the firſt rank muſt not be taken, becauſe 4 — 1, *viz.* 3, does divide 9. The reaſon of this rule will appear very evidently, by conſidering in what manner the returns of the ſame numbers do or do not happen, taking them always in the ſame manner in any given ſeries. And hence it follows, that the fewer diviſions the root of any ſquare to be conſtructed has, the more different manners of conſtructing it there are; and that the prime numbers, *i. e.* thoſe which have no diviſions, as 5, 7, 11, 13, &c. are thoſe whoſe ſquares will admit of the moſt variations in proportion to their quantities.

The ſquares conſtructed, according to this method, have ſome particular properties not required in the problem; for the numbers that compoſe any rank parallel to one of the two diagonals, are ranged in the ſame order with the numbers that compoſe the diagonal to which they are parallel. And as any rank parallel to a diagonal muſt neceſſarily be ſhorter, and have fewer cells, than the diagonal itſelf, by adding to it the correſpondent parallel, which has the number of cells by which the other falls ſhort of the diagonal, the numbers of thoſe two parallels, placed, as it were, end to end, ſtill follow the ſame order with thoſe of the diagonal: beſides, that their ſums are likewiſe equal; ſo that they are magical on another account. Inſtead of the ſquares, which we have hitherto formed by horizontal ranks, one might alſo form them by vertical ones; the caſe is the ſame in both.

First Primitive.

1	2	3	4	5	6	7
3	4	5	6	7	1	2
5	6	7	1	2	3	4
7	1	2	3	4	5	6
2	3	4	5	6	7	1
4	5	6	7	1	2	3
6	7	1	2	3	4	5

All we have hitherto ſaid regards only the firſt primitive ſquare, whoſe numbers, in the propoſed example, were 1, 2, 3, 4, 5, 6, 7; here ſtill remains the ſecond primitive, whoſe numbers are

Second Primitive.

0	7	14	21	28	35	42
21	28	35	42	0	7	14
42	0	7	14	21	28	35
14	21	28	35	42	0	7
35	42	0	7	14	21	28
7	14	21	28	35	42	0
28	35	42	0	7	14	21

are 0, 7, 14, 21, 28, 35, 42. M. de la Hire proceeds in the same manner here as in the former; and this may likewise be constructed in 20,160 different manners, as containing the same number of terms with the first. Its construction being made, and of consequence all its ranks making the same sum, it is evident, that if we bring the two into one, by adding together the numbers of the two corresponding cells of the two squares, that is, the two numbers of the first of each, the two numbers of the second, of the third, &c. and dispose them in the forty-nine corresponding cells of a third square; it will likewise be magical, in regard to its rank, formed by the addition of equal sums to equal sums, which must of necessity be equal among themselves. All that remains in doubt is, whether or not, by the addition of the corresponding cells of the two first squares, all the cells of the third will be filled in such manner, as that each not only contains one of the numbers of the progression from 1 to 49, but also that this number be different from any of the rest, which is the end and design of the whole operation.

As to this it must be observed, that if in the construction of the second primitive square, care has been taken in the commencement of the second horizontal rank, to observe an order with regard to the first, different from what was observed in the construction of the first square; for instance, if the second rank of the first square began with the third term of the first rank, and the second rank of the second square commence with the fourth of the first rank, as in the example it actually does; each number of the first square may be combined once, and only once, by addition with all the numbers of the second. And as the numbers of the first are here 1, 2, 3, 4, 5, 6, 7, and those of the second 0, 7, 14, 21, 28, 35, 42, by combining them in this manner, we have all the numbers in the progression from 1 to 49, without having any of them repeated; which is the *perfect* magic square proposed.

Perfect Square.

1	9	17	25	33	41	49
24	32	40	48	7	8	16
47	6	14	15	23	31	39
21	22	31	38	46	5	13
37	47	4	12	20	28	29
11	19	27	35	36	46	3
34	42	43	2	10	18	26

The necessity of constructing the two *primitive* squares in a different manner, does not at all hinder but that each of the 20,160 constructions of the one may be combined with all the 20,160 constructions of the other: of consequence, therefore, 20,160 multiplied by itself, which makes 406425600, is the number of different constructions that may be made of the perfect square, which here consists of the 49 numbers of the natural progression. But as we have already observed, that a primitive square of seven numbers repeated may have above 20,160 several constructions, the number 406425600 must come vastly short of expressing all the possible constructions of a perfect magic square of the 49 first numbers.

As to the *even* squares, he constructs them like the *uneven* ones, by two primitive squares; but the construction of *primitives* is different in general, and may be so a great number of ways: and those general differences admit of a great number of particular variations, which give as many different constructions of the same even square. It scarcely seems possible to determine exactly, either how many general differences there may be between the construction of the primitive squares of an even square, and an uneven one; nor how many particular variations each general difference may admit of; and, of consequence, we are still far from being able to determine the number of different constructions of all those that may be made by the primitive squares.

See the Memoirs of the Royal Academy of Sciences, for 1705 and 1710, where this subject is almost exhausted by M. de la Hire and M. Sauveur. See also Saunderson's Algebra, vol. i. p. 354, &c.

The ingenious Dr. Franklin seems to have carried this curious speculation farther than any of his predecessors in the same way. He has constructed not only a magic square of squares, but likewise a magic circle of squares, of which we shall give some account for the amusement of our readers. The magic square of squares is formed by dividing the great square, as *Plate* XI. *Analysis*, *fig.* 6. The great square is divided into 256 small squares, in which all the numbers from 1 to 256 are placed in 16 columns, which may be taken either horizontally or vertically. The properties are as follow:

1. The sum of the sixteen numbers in each column, vertical and horizontal, is 2056.

2. Every half column, vertical and horizontal, makes 1028, or half of 2056.

3. Half a diagonal ascending, added to half a diagonal descending, makes 2056; taking these half diagonals from the ends of any side of the square to the middle thereof; and so reckoning them either upward, or downward; or sidewise from left to right hand, or from right to left.

4. The same with all the parallels to the half diagonals, as many as can be drawn in the great square: for any two of them being directed upward and downward, from the place where they begin to that where they end, their sums will make 2056. The same downward and upward in like manner: or all the same if taken sideways to the middle, and back to the same side again. N. B. One set of these half diagonals and their parallels are drawn in the same square upward and downward. Another such set may be drawn from any of the other three sides.

5. The four corner numbers in the great square added to the four central numbers therein, make 1028; equal to the half sum of any vertical or horizontal column, which contains 16 numbers; and equal to half a diagonal or its parallel.

6. If a square hole (equal in breadth to four of the little squares) be cut in a paper, through which any of the sixteen little squares in the great square may be seen, and the paper be laid on the great square; the sum of all the sixteen numbers, seen through the hole, is equal to the sum of the sixteen numbers in any horizontal or vertical column, *viz.* to 2056.

The magic circle of circles (*fig.* 7.), is composed of a series of numbers, from 12 to 75 inclusive, divided into eight concentric circular spaces, and ranged in eight radii of numbers, with the number 12 in the centre; which number, like

like the centre, is common to all theſe circular ſpaces, and to all the radii.

The numbers are ſo placed, that the ſum of all thoſe in either of the concentric circular ſpaces above mentioned, together with the central number 12, make 360; equal to the number of degrees in a circle.

The numbers in each radius alſo, together with the central number 12, make juſt 360.

The numbers in half of any of the above circular ſpaces, taken either above or below the double or horizontal line, with half the central number 12, make 180: equal to the number of degrees in a ſemicircle.

If any four adjoining numbers be taken, as if in a ſquare, in the radial diviſions of theſe circular ſpaces; the ſum of theſe, with half the central number, make 180.

There are, moreover, included four ſets of other circular ſpaces, bounded by circles which are excentric with reſpect to the common centre; each of theſe ſets containing five ſpaces. The centres of the circles which bound them are at A, B, C, and D. The ſet, whoſe centre is at A, is bounded by dotted lines; the ſet whoſe centre is at C is bounded by lines of ſhort unconnected ſtrokes, and the ſet round D is bounded by lines of unconnected longer ſtrokes, to diſtinguiſh them from one another. In drawing this figure by hand, the ſet of concentric circles ſhould be drawn with black ink; and the four different ſets of excentric circles with four kinds of ink of different colours; as blue, red, yellow, and green, for diſtinguiſhing them readily from one another.

Theſe ſets of excentric circular ſpaces interſect thoſe of the concentric, and each other; and yet, the numbers contained in each of the excentric ſpaces, taken all around through any of the 20, which are excentric, make the ſame ſum as thoſe of the concentric; namely, 360, when the central number 12 is added. Their halves alſo, taken above or below the double or horizontal line, with half the central number, make 180.

Obſerve, that there is not one of the numbers but what belongs at leaſt to two of the circular ſpaces; ſome to three, ſome to four, ſome to five: and yet they are all ſo placed as never to break the required number 360, in any of the twenty-eight circular ſpaces within the primitive circle.

To bring theſe matters in view, all the numbers as abovementioned are taken out, and placed in ſeparate columns, as they ſtand around both the concentric and excentric circular ſpaces, always beginning with the outermoſt and ending with the innermoſt of each ſet; and alſo the numbers as they ſtand in the eight radii, from the circumference to the centre; the common central number 12 being placed the loweſt in each column.

1. In the eight concentric circular ſpace.

14	72	23	65	21	67	12	74
25	63	16	70	18	68	27	61
30	56	39	49	37	51	28	58
41	47	32	54	34	52	43	45
46	40	55	33	53	35	44	42
57	31	48	38	50	36	59	29
62	24	71	17	69	19	60	26
73	15	64	22	66	20	75	13
12	12	12	12	12	12	12	12
360	360	360	360	360	360	360	360

2. In the eight radii.

14	25	30	41	46	57	62	73
72	63	56	47	40	31	24	15
23	16	39	32	55	48	71	64
65	70	49	54	33	38	17	22
31	18	37	34	53	50	69	66
67	68	51	52	35	36	19	20
12	27	28	43	44	59	60	75
74	61	58	45	42	29	26	13
12	12	12	12	12	12	12	12
360	360	360	360	360	360	360	360

3. In the five excentric circular ſpaces whoſe centre is at A.

14	72	23	65	21
63	16	70	18	68
39	49	37	51	28
54	34	52	43	45
33	53	35	44	42
48	38	50	36	59
24	71	17	69	19
73	15	64	22	66
12	12	12	12	12
360	360	360	360	360

4. In the five excentric circular ſpaces whoſe centre is at B.

30	56	39	49	37
47	32	54	34	52
55	33	53	35	44
38	50	36	59	29
17	69	19	60	26
64	22	66	20	75
72	23	65	21	67
25	63	16	70	18
12	12	12	12	12
360	360	360	360	360

5. In the five excentric circular ſpaces whoſe centre is at C.

46	40	55	33	53
31	48	38	50	36
71	17	69	19	60
22	66	20	75	13
65	21	67	12	74
16	70	18	68	27
56	39	49	37	51
41	47	32	54	34
12	12	12	12	12
360	360	360	360	360

6. In the five excentric circular ſpaces whoſe centre is at D.

62	24	71	17	69
15	64	22	66	20
23	65	21	67	12
70	18	68	27	61
49	37	51	28	58
32	54	34	52	43
40	55	33	53	35
57	31	48	38	50
12	12	12	12	12
360	360	360	360	360

If now we take any four numbers as in a ſquare form, either from No. 1. No. 2. (as ſuppoſe from No. 1.) as in the margin; and add half the central

14 72
25 63
6

number

number 12 to them, the sum will be 180; equal to half the numbers in any circular space, taken above or below the double horizontal line: and equal to the number of degrees in a semicircle. Thus, 14, 72, 25, 63, and 6, make 180. See Franklin's Exp. and Obs. p. 350, &c. edit. 4to. 1769; or Ferguson's Tables and Tracts, 1771, p. 318, &c.

MAGICAL *Picture*, in *Electricity*, was first contrived by Mr. Kinnersley, and is thus made: having a large mezzotinto with a frame and glass, *e. gr.* of the king, take out the print, and cut a pannel out of it, near two inches distant from the frame all round; with thin paste or gum-water, fix the border that is cut off on the inside of the glass, pressing it smooth and close; then fill up the vacancy by gilding the glass well with leaf-gold, or brass. Gild likewise the inner edge of the back of the frame all round, except the top part, and form a communication between that gilding and the gilding behind the glass; then put in the board, and that side is finished. Turn up the glass, and gild the fore-side exactly over the back gilding, and when it is dry, cover it, by pasting on the pannel of the picture that hath been cut out, observing to bring the correspondent parts of the border and picture together, by which means the picture will appear of a piece, as at first, only part behind the glass and part before. Hold the picture horizontally by the top, and place a little moveable gilt crown on the king's head. If now the picture be moderately electrified, and another person takes hold of the frame with one hand, so that his fingers touch its inside gilding, and with the other hand endeavour to take off the crown, he will receive a terrible blow, and fail in the attempt. If the picture were highly charged, the consequence might be as fatal as that of high treason. The operator, who holds the picture by the upper end, where the inside of the frame is not gilt, to prevent its falling, feels nothing of the shock, and may touch the face of the picture without danger. If a ring of persons take the shock among them, the experiment is called the conspirators. Franklin's Exp. and Obs. p. 30.

MAGICIAN, one who practises the art of magic. See DIVINATION, MAGIC, and SORCERY.

The ancient magicians pretended to extraordinary powers of interpreting dreams, foretelling future events, and accomplishing many wonderful things, by their superior knowledge of the secret powers of nature, of the virtues of plants and minerals, and of the motions and influences of the stars. And as the art of magic among the Pagan nations was founded in their system of theology, and the Magi who first exercised it were the priests of the gods, they pretended to derive these extraordinary powers from the assistance of the gods; which assistance they sought by a great variety of rites and sacrifices, adapted to their respective natures, by the use of charms and superstitious words, and also by ceremonies and supplications: they pretended likewise, in the proper use of their art, to a power of compelling the gods to execute their desires and commands. An excellent writer has shewn, that the scripture brands all these powers as a shameless imposture, and reproaches those who assumed them with an utter inability of discovering or accomplishing any thing supernatural. (See Isaiah, xlvii. 11, 12, 13. chap. viii. 18, 19. chap. xli. 23, 24. chap. xliv. 25. Jerem. x. 2, 3. 8. 14. chap. xiv. 14. chap. xxvii. 9, 10. chap. l. 36. Ps. xxi. 6. Jonah, ii. 8.) Nevertheless, many of the Christian fathers, as well as some of the heathen philosophers, ascribed the efficacy of magic to evil dæmons: and it was a very prevailing opinion in the primitive church, that magicians and necromancers, both among the Gentiles and heretical Christians, had each their particular dæmons perpetually attending on their persons, and obsequious to their commands, by whose help they could call up the souls of the dead, foretel future events, and perform miracles. In support of this opinion, it has been alleged, that the names by which the several sorts of diviners are described in scripture, imply a communication with spiritual beings; that the laws of Moses (Exod. xxii. 18. Lev. xix. 26. 31. chap. xx. 27. Deut. xviii. 10, 11.) against divination and witchcraft, prove the efficacy of these arts, though in reality they prove nothing more than their execrable wickedness and impiety; and that pretensions to divination could not have supported their credit in all the heathen nations and through all ages, if some instances of true divination had not occurred. But the strongest argument is derived from the scripture history of the Egyptian magicians who opposed Moses. With regard to the works performed by these magicians, some have supposed that God himself empowered them to perform true miracles, and gave them an unexpected success; but the history expressly ascribes the effects they produced, not to God, but to their own inchantments. Others imagine, that the devil assisted the magicians not in performing true miracles, but in deceiving the senses of the spectators, or in presenting before them delusive appearances of true miracles: against which opinion it has been urged, that it tends to disparage the credit of the works of Moses. The most common opinion since the time of St. Austin, has been, that they were not only performed by the power of the devil, but were genuine miracles, and real imitations of those of Moses. In a late elaborate inquiry into the true sense and design of this part of scripture history, it has been shewn, that the names given to the magicians seem to express their profession, their affectation of superior knowledge, and their pretences both to explain and effect signs and wonders, by observing the rules of their art; and therefore, that they are the persons, whose ability of discovering or effecting any thing supernatural the scripture expressly denies. The learned author farther investigates the design, for which Pharaoh employed them on this occasion: which, he apprehends, was to learn from them, whether the sign given by Moses was truly supernatural, or only such as their art was able to accomplish. Accordingly it is observed, that they did not undertake to outdo Moses, or to controul him, by superior or opposite arts of power, but merely to imitate him, or to do the same works with his, with a view of invalidating the argument which he drew from his miracles, in support of the sole divinity of Jehovah, and of his own mission. The question on this occasion was not, are the gods of Egypt superior to the God of Israel, or can any evil spirits perform greater miracles than those which Moses performed by the assistance of Jehovah? but the question was, are the works of Moses proper proofs, that the God of Israel is Jehovah, the only sovereign of nature, and consequently that Moses acts by his commission; or, are they merely the wonders of nature, and the effects of magic? In this light Philo, (de Vita Mosis, lib. i. p. 616.) and Josephus, (Antiq. Jud. lib. ii. cap. 13.) place the subject. Moreover, it appears from the principles and conduct of Moses, that he could not allow the magicians to have performed real miracles: because the scripture represents the whole body of magicians as impostors; the sacred writers, Moses in particular, describe all the heathen deities, in the belief of whose existence and influence the magic art was founded, as unsupported by any invisible spirits, and utterly impotent and senseless: the religion of Moses was built on the unity and sole dominion of God, and the sole divinity of Jehovah was the point which Moses was now about to establish, in direct opposition to the

the principles of idolatry; ſo that if he had allowed that the heathen idols, or any evil ſpirits ſupporting their cauſe, enabled the magicians to turn rods into ſerpents, and water into blood, and to create frogs, he would have contradicted the great deſign of his miſſion, and overthrown the whole fabric of his religion; beſides, Moſes appropriates all miracles to God, and urges his own, both in general and ſeparately, as an abſolute and authentic proof, both of the ſole divinity of Jehovah, and of his own miſſion; which he could not juſtly have done, if his oppoſers performed miracles, and even the ſame with his. On the other hand, it has been urged, that Moſes deſcribes the works of the magicians in the very ſame language as he does his own, (Exod. vii. 11, 12. chap. v. 22. chap. viii. 7.) and hence it is concluded, that they were equally miraculous. To this objection it is replied, that it is common to ſpeak of profeſſed jugglers, as doing what they pretend and appear to do; but that Moſes does not affirm, that there was a perfect conformity between his works and thoſe of the magicians, but they did *ſo*, or in like manner, uſing a word which expreſſes merely a general ſimilitude; and he expreſsly refers all they did, or attempted in imitation of himſelf, not to the invocation or power of dæmons, or of any ſuperior beings, but to human artifice and impoſture. The original words, tranſlated *inchantments*, (Exod. vii. 11, 22. and chap. viii. 7, 18) import deception and concealment, and ought to have been rendered, *ſecret ſlights* or *jugglings*. Our learned writer farther ſhews, that the works performed by the magicians did not exceed the cauſe, or human artifice, to which they are aſcribed. Farmer's Diſſ. on Miracles, 1771, chap. 3. § 3. chap. 4. § 1.

MAGIEROW, in *Geography*, a town of Poland, in the palatinate of Belcz; 22 miles S.S.W. of Belcz.

MAGILLICUDDY's Reeks, high mountains in the county of Kerry, Ireland, lying near Killarney. They are ſuppoſed to be higher than Mangerton, which is 2500 feet above the level of the ſea.

MAGILLIGAN Point, a cape of Ireland, in the county of Londonderry, at the entrance of Lough Feyle. N. lat. 55° 12′. W. long. 6° 50′.

MAGINI, John Anthony, in *Biography*, an Italian mathematician and aſtronomer, was born at Padua in the year 1556. He acquired an early reputation for acquaintance with the ſciences, and was appointed profeſſor of mathematics in the univerſity of Bologna. He was decidedly in favour of the Copernican ſyſtem, but had not courage openly to avow his opinions; and to prevent any diſputes that might occur, and to avoid the penalties of hereſy, he taught the doctrine of Ptolemy. He was a practical philoſopher, and made the inſtruments which he uſed with his own hands, among theſe were large concave mirrors, full five feet in diameter. He died in 1617, in the ſixty-ſecond year of his age, leaving behind him many works that reflect much credit on his memory: among theſe the moſt important were his "Ephemerides," in three volumes, from 1580 to 1630: "Theoria Planetarum juxta Copernicas Obſervationes:" "Problemata Aſtronomica, Gnomonica, et Geographica:" "Italiæ Deſcriptio Chorographica," illuſtrated with ſixty maps. Bayle.

MAGISI, in *Geography*, a town of Brazil, in the government of St. Paul; 36 miles N.E. of St. Paul.

MAGISTER, Master, a title frequently found in old writings; noting the perſon who bore it to have attained ſome degree of eminence *in ſcientia aliqua, præſertim in literaria*.

In old times, thoſe we now call *doctors*, were called *magiſtri*, or *maſters*.

MAGISTERY, in *Chemiſtry*, a term formerly uſed to ſignify a *precipitate*. Since the new nomenclature of chemiſtry has been introduced, it has become obſolete.

Magistery *of Biſmuth*. See Bismuth.

Magistery *of Lead*. See Lead.

Magistery *of Sulphur*. See Sulphur.

MAGISTRATE is the name of any public officer, or ruler, to whom the executive power of the law is committed, either wholly or in part. Of magiſtrates ſome are ſupreme, in whom the ſovereign power of the ſtate reſides; others are ſubordinate, deriving all their authority from the ſupreme magiſtrates, accountable to him for their conduct, and acting in an inferior ſecondary ſphere. In all tyrannical governments, the ſupreme magiſtracy, or the right both of *making* and of *enforcing* the laws, is veſted in one and the ſame man, or one and the ſame body of men; and whenever theſe two powers are united together, there can be no public liberty. The magiſtrate may enact tyrannical laws, and execute them in a tyrannical manner, ſince he is poſſeſſed, in quality of diſpenſer of juſtice, with all the power which he, as legiſlator, thinks proper to give himſelf. But when the legiſlative and executive authority are in diſtinct hands, the former will take care not to entruſt the latter with ſo large a power as may tend to the ſubverſion of its own independence, and therewith of the liberty of the ſubject. With us in England, therefore, the ſupreme power is divided into two branches; the one legiſlative, *viz.* the parliament, conſiſting of king, lords, and commons; the other executive, conſiſting of the king alone. See King, Parliament, Sheriff, Justice, &c.

MAGIUS, Al, in *Geography*, a town of Perſia, in the province of Farſiſtan; 45 miles S.W. of Yezd.

MAGLASAN, a town of Perſia, in the province of Adirbeitzan; 66 miles W. of Tauris.

MAGLEBIE, a town of Denmark, in the iſland of Zealand; four miles S. of Copenhagen.

MAGLIA, a town of the iſland of Candia; 16 miles E.S.E. of Candia.

MAGLIABECCHI, Anthony, in *Biography*, a perſon remarkable for his knowledge of books, was born at Florence in 1633. Having attained the elements of the Latin language, he was apprenticed to the buſineſs of a goldſmith and jeweller, but his paſſion for reading induced him to employ every leiſure moment in improving his mind, and in laying in large ſtores of uſeful knowledge; and at the death of his parents in 1673, he entirely abandoned trade, and devoted himſelf wholly to the purſuits of literature. By means of an aſtoniſhing memory, and almoſt inceſſant application, he became more converſant with literary hiſtory than any man of his time, and was appointed librarian to the grand duke of Tuſcany. He kept up a correſpondence with the moſt learned men in Europe, from many of whom, even in the very higheſt ranks of life, he received tokens of reſpect and eſteem. Lewis XIV. always commiſſioned the French literati who viſited Italy to ſalute Magliabecchi in his name. To thoſe who viſited him through motives of mere curioſity, he was diſtant and reſerved; but to the truly learned, no man was more communicative of his knowledge, and many of the moſt eminent ſcholars of the time have expreſſed their obligations to him. He could moſt readily direct an author to all the works which treated upon the ſubject on which he was writing. So expert and accurate was he in this reſpect, that he has been called a living library. He was taken ſeriouſly ill in 1708, and upon his recovery Ferdinand wiſhed him to lodge in the palace, and prepared for him a commodious apartment, and a large room for his books. Here he reſided a few months, and then returned to his own cottage, where he died, at the age

age of eighty-one, in the year 1714. Magliabecchi was a man of a most forbidding and savage aspect, and exceedingly negligent of his person. His habits were solitary and cynical, never indulging in the pleasures of society, or the gratifications of sense. He refused to be waited upon, and rarely took off his clothes to go to bed. In the midst of the coldest winter he made the same cloak a covering for the day and the night. His dinner was commonly three hard boiled eggs, with a draught of water. He spent some hours in each day at the palace library, but is said never in his life to have gone farther from Florence than to Pratz, whither he once accompanied cardinal Norris to see a manuscript. He had a small window in his door, through which he could see all those who approached him, and if he did not wish their company he would not admit them.

MAGLIANO, in *Geography*, a town of Italy, in the Sabina, a bishop's see; 28 miles N. of Rome. N. lat. 42° 20'. E. long. 12° 28'.—Also, a town of Etruria; 12 miles N.E. of Orbitello.

MAGLOI, a town of Bosnia, on the Bosna; 21 miles N. of Serajo.

MAGMA, Μαγμα, among *Chemists*, &c. the dregs or recrements of a composition remaining after all the more fluid parts are expressed.

It is a word used by medical writers on many occasions, sometimes in a very lax, and sometimes in a more appropriated sense. Some writers use it to express a mass of any thing; others for a thick ointment made up with very little fluid matter to prevent its running; and others for the remains of an ointment after expression from its ingredients. Galen restrains the word *magma* to express only the fæces of myrobalans.

MAGNA Arteria, in *Anatomy*. See Aorta and Artery.

Magna *Assiza Eligenda*, a writ directed to the sheriff to summon four lawful knights before the justice of assize, there, upon their oaths, to choose twelve knights of the vicinage, &c. to pass upon the *great assize* between A. B. plaintiff, and C. D. defendant, &c. See Assises.

Magna *Charta*, the *great charter* of liberties of England, signed and sealed by king John in a conference between the king and barons at Runnemede, between Windsor and Staines, June 19th, A.D. 1215, and confirmed by Hen. III. and Edward I.

The reason of its being termed *Magna*, or *great*, is either because of the excellency of the laws and liberties therein contained, or because there was another charter, called *Charta de Foresta*, established with it, which was the lesser of the two; or else because it contained more than any other charters; or in regard of the wars and troubles in the obtaining of it; or of a great and remarkable solemnity in the denouncing excommunications against the infringers of it.

Magna Charta may be said to derive its origin from king Edward the Confessor, who granted divers liberties and privileges, both civil and ecclesiastical, by charter: the same, with some others, were also granted and confirmed by king Henry I., soon after his coronation and agreeably to an oath by which he had bound himself before he was crowned, by a celebrated great charter.

By this charter he restored the Saxon laws which were in use under Edward the Confessor, but with such alterations, or (as he styled them) "emendations, as had been made in them by his father, with the advice of his parliament," at the same time annulling "all evil customs and illegal exactions, by which the realm had been unjustly oppressed." Some of these grievances were specified in the charter, and the redress of them was there expressly enacted. It also contained very considerable mitigations of those feudal rights claimed by the king over his tenants, and by them over their's, which either were the most burthensome in their own nature, or had been made so by an abusive extension. In short, all the liberty, that could well be consistent with the safety and interest of the lord in his fief, was allowed to the vassal by this charter, and the profits due to the former were settled according to a determined and moderate rule of law. According to the words of one of our greatest antiquaries, sir Henry Spelman, "it was the original of king John's Magna Charta, containing most of the articles of it, either particularly expressed, or in general, under the confirmation it gives to the laws of Edward the Confessor." So mistaken are they, says lord Lyttelton, who have supposed that all the privileges granted in Magna Charta were "innovations" extorted by the arms of rebels from king John!—a notion which seems to have been first taken up, not so much out of ignorance, as from a base motive of adulation to some of our princes in later times, who, endeavouring to grasp at absolute power, were desirous of any pretence to consider those laws, which stood in their way, as violent encroachments made by the barons on the ancient right of the crown; whereas they were in reality restitutions and sanctions of ancient rights, enjoyed by the nobility and people of England in former reigns; or limitations of powers which the king had illegally and arbitrarily stretched beyond their due bounds. In some respects, says our author, this charter of Henry I. was more advantageous to liberty than *Magna Charta* itself. (See Henry I.) In confirmation of sir Henry Spelman's opinion above-mentioned, we may allege the testimony of an ancient historian. Matthew Paris tells us, that, in the year 1215, the barons came in arms to king John at London, and demanded of him that certain liberties and laws of king Edward, with other liberties granted to them, and to the kingdom and church of England, should be confirmed, "as they were contained and set down in the charter of king Henry I. and in the laws above-mentioned." And the same historian, where he mentions the "capitula," or rough draught of the great charter, delivered to John by the barons, says, that the articles thereof "were partly written before, in the charter of king Henry I. and partly taken out of the ancient laws of king Edward." These passages, and also what he says before, of the barons having sworn at St. Edmund's Bury, to make war on the king, till he should confirm to them, by a charter under his seal, the laws and liberties granted in the charter of Henry I., sufficiently shew, that they understood and intended this charter to be the original and foundation of that which they demanded and obtained from John. With regard to another passage that occurs in Matthew Paris, relating to the charter of Henry I. and connected with his account of a convention or synod held in London under Stephen Langton, archbishop of Canterbury, in the year 1213, it imports that the charter of king Henry was then a "novelty" to the barons, and that they expressed a surprise of joy at hearing a copy of it read, which the archbishop told them was "just found." But from the same historian we learn that, after the charter was given, the king ordered as many transcripts of it to be made as there were counties in England, and to be laid up, as records, in the abbies of every county. Besides, the first charter of Stephen "confirms the liberties and good laws, which his uncle king Henry gave and granted, and all good laws and good customs, which the nation had enjoyed in the time of Edward the Confessor," words which evidently refer to the charter. It was also confirmed more expressly by king Henry II. "How is it possible then," says lord Lyttelton,

Lyttelton, "that in the reign of his fon it fhould be fo difficult to produce a fingle tranfcript of it, and that even the remembrance of what it contained fhould be fo totally loft among the principal nobles? The ftrong objections to fo ftrange a ftory did not efcape the penetration of the learned and judicious Dr. Blackftone. In his accurate edition of the charters, he takes notice of the great improbability of it; and further obferves, that it is mentioned by no other contemporary hiftorian; but that, on the contrary, all of them affign quite different reafons for the confederacy of the barons." Our noble author adds, "that the credit of this ftory is ftill more weakened, by its being only delivered *upon common fame* (*ut fama refert*), though it is faid to have paft *in fecret*."—"How can one fuppofe that the particular words of a fpeech *made in fecret*, could be accurately reported by *common fame*?"—"That the archbifhop fhould produce to the barons a tranfcript of the charter, as a proper foundation for their confederacy, and for the demands, or claim of rights, they were to make to the king, I think (fays lord Lyttelton) is very probable. But that there could be any difficulty in finding fuch a tranfcript, or that it fhould be regarded by them as a novelty, appears to me quite incredible." "How far Matthew Paris, or rather Roger de Wendover, (from whom the former has tranfcribed this part of his hiftory), is from being exact in his account of thefe affairs, we need no better evidence, than the copy he gives us of the charter of king John, which is effentially different from the originals in the Britifh Mufeum and at Salifbury, and from the entry in the Red Book of the Exchequer. No hypothefis, therefore, can reafonably be built on this paffage in that writer; though fome have been induced to infer from it, that the charter of Henry I. became obfolete almoft as foon as it was given, and was fo totally neglected, as to be in a manner forgotten." But to return from this digreffion, the fucceffors of Henry I. king Stephen, king Henry II. and king John, confirmed or re-enacted the fame; but the laft prince violating his charter, the barons took up arms, and his reign ended in blood. Henry III who fucceeded him, after having procured an inquifition to be made by twelve men in each county, what the liberties of England were in the time of Henry I., confirmed, with fome alterations, the charter, obtained fword in hand from king John, in 1215, being the prefent Magna Charta; which he feveral times confirmed and as often broke again; till in the thirty-feventh year of his reign, he came to Weftminfter-hall, where, in the prefence of the nobility and bifhops, with lighted candles in their hands, Magna Charta was read, the king all the while laying his hand on his breaft, and at laft folemnly fwearing faithfully and inviolably to obferve all the things therein contained, as he was a man, a Chriftian, a foldier, and a king. Then the bifhops extinguifhed their candles, throwing them on the ground, crying, "Thus let him be extinguifhed and ftink in hell who violates this charter."

Neverthelefs, king Henry in the next year invaded the rights of his people, till the barons levied war againft him; and, after various fuccefs, he confirmed this charter and the charter of the forefts, in the parliament of Marlbridge, and in the fifty-fecond year of his reign. Afterwards, by ftatute 25 Edw. I. called *Confirmatio chartarum*, whereby the great charter is directed to be allowed as the common law, all judgments contrary to it are declared void; copies of it are ordered to be fent to all cathedral churches, and read twice a year to the people; and fentence of excommunication is directed to be as conftantly denounced againft all thofe that by word, deed, or counfel, act contrary thereto, or in any degree infringe it. Sir Edward Coke obferves, that it was confirmed no lefs than thirty-two times, from the firft Edward to Henry IV. Then, after a long interval, by the Petition of Right, by many falutary laws, particularly the Habeas Corpus act of Charles II. by the Bill of Rights, and laftly by the Act of Settlement.

The Magna Charta is the bafis of the Englifh laws and liberties: befides thofe provifions, which redreffed many grievances incident to feodal tenures, care was alfo taken therein to protect the fubject againft other oppreffions, frequently arifing from unreafonable amercements, from illegal diftrefs, or other procefs for debts or fervices due to the crown, and from the tyrannical abufe of the prerogative of purveyance, and pre-emption. It fixed the forfeiture of lands for felony in the fame manner as it ftill remains; prohibited for the future the grants of exclufive fifheries, and the erection of new bridges, fo as to opprefs the neighbourhood. With refpect to private right, it eftablifhed the teftamentary power of the fubject over part of his perfonal eftate, the reft being diftributed among his wife and children: it laid down the law of dower, as it continued ever fince; and prohibited the appeals of women, unlefs for the death of their hufbands. In matters of public police and national concern, it enjoined an uniformity of weights and meafures; gave new encouragement to commerce, by the protection of merchant-ftrangers; and forbad the alienation of lands in mortmain. With regard to the adminiftration of juftice; befides prohibiting all denials or delays of it, it fixed the court of common pleas at Weftminfter, that the fuitors might no longer be haraffed with following the king's perfon in all his progreffes; and at the fame time brought the trials of iffues home to the very doors of the freeholders, by directing affizes to be taken in the proper counties, and eftablifhing annual circuits; it alfo corrected fome abufes then incident to the trials by wager of law and of battle: directed the regular awarding of inqueft for life or member; prohibited the king's inferior minifters from holding pleas of the crown, or trying any criminal charge, whereby many forfeitures might otherwife have unjuftly accrued to the exchequer; and regulated the time and place of holding the inferior tribunals of juftice, the county-court, fheriff's torn, and court-leet. It confirmed and eftablifhed the liberties of the city of London, and all other cities, boroughs, towns, and ports of the kingdom. And laftly, (which alone would have merited the title that it bears of the *Great Charter*) it protected every individual of the nation in the free enjoyment of his life, his liberty, and his property, unlefs declared to be forfeited by the judgment of his peers or the law of the land. Blackft. Comm. vol. iv.

MAGNAL-LAVAL, in *Geography*, a town of France, in the department of the Upper Vienne, and chief place of a canton, in the diftrict of Bellac; 24 miles N. of Limoges. The place contains 2654, and the canton 6759 inhabitants, on a territory of 162½ kiliometres, in five communes.

MAGNANINA, in *Ornithology*, the name of a fmall bird defcribed by Aldrovand, Gefner, and fome other authors, and feeming to be the fame with our hedge-fparrow, commonly known among authors by the name of *curruca*. See MOTACILLA *modularis*.

MAGNANO, in *Geography*, a town of the duchy of Piacenza; 13 miles S.S.E. of Piacenza.

MAGNENTIUS, MAGNUS, in *Biography*, a German by birth, but who, from being a private foldier, rofe to the chief employments in the Roman empire. He owed his diftinguifhed ftation to the circumftance of his having been made a prifoner of war. To free himfelf from chains he joined the Roman troops, and became diftinguifhed for valour. He was commander of the Jovian and Herculean bands, ftationed to guard the banks of the Rhine, at the time

time when Conftans I. emperor of the Weft, had incurred the contempt of the army on account of his indolence and voluptuoufnefs. In 350, he afcended the throne, and on the murder of Conftans, he was left without a rival in the Gallic and Italian præfectures. At Rome, Magnentius acted with great tyranny, and by his various extortions, he was enabled to levy a very powerful army to maintain his ufurped authority. So formidable did he appear, that Conftantius, emperor of the Eaft, and brother of the deceafed Conftans, fought a peace, on the terms of leaving him in poffeffion of Gaul, Spain, and Britain, but his propofals were rejected. Conftantius now determined to attack him; a bloody battle enfued, which terminated in the total defeat of Magnentius. He fled to the foot of the Julian alps, and collected the fcattered remains of his army, pofted them advantageoufly to defend the paffes, and fpent the winter in Aquileia. After this he went to Gaul, and obtained a victory over the van of the purfuing enemy at Pavia. His troops, however, foon fuftained another defeat, after which he took refuge in Lyons, where he difpatched himfelf with his own fword. This event took place in the year 353, after a reign of nearly four years. The example of fuicide was imitated by Decentius, who ftrangled himfelf on the news of his brother's death. A fevere inquifition was extended over all who, either from choice or compulfion, had been involved in the caufe of Magnentius. The moft innocent people were expofed to exile and confifcation, to death and torture, and, fays Gibbon, "as the timid are always cruel, the mind of Conftantius was inacceffible to mercy." Gibbon.

MAGNES, in *Geography*, a town of the ifland of Candia, on the N. coaft, fuppofed by Dr. Pocock to be the ancient Dictamnum, or Dictynna; 12 miles N.W. of Canea.

MAGNES *Carneus*, in *Natural Hiftory*, a name given by Cardan and fome other authors to a white earth dug in Italy and fome other places, and called alfo by many calamita alba. It is an indurated earthy fubftance of the hardnefs of ofteocolla, and is of a white colour variegated with black lines. It adheres very firmly to the tongue, and is hence faid to attract flefh in the fame manner as the magnet does iron. It is even pretended, that if an iron ftylus be rubbed over with this ftony earth, and then plunged into the flefh, the virtue of the earth will heal the wound as foon as made, and when the weapon is taken forth, there will remain no appearance of hurt. Cardan affirms that he faw this tried with fuccefs, but fufpects witchcraft in the cafe.

MAGNESIA, in *Agriculture*, a fubftance which has not yet been found in a pure ftate in nature; it is conftantly combined either with acids in the form of earthy falts, or mixed with other earths, as *ferpentine*, *fteatites*, *talc*, *afbeftos*, &c. With a view to moft purpofes, it is commonly prepared by the decompofition of bitter falt, by the fixed mild alkalies, and fubfequent feparation of the carbonic acid by calcination.

But the experiments of Mr. Tennant feem to fhew, that this fubftance, when in combination with calcareous matters, fuch as that of lime, &c. is unfriendly to vegetation. It is, however, obferved by lord Dundonald, that it is found "in a variety of earths and ftones, and that it combines with acids, forming neutral falts, all of which are very foluble, and the greater part of them promotes, in a very confiderable degree, the growth of plants. Magnefian earths, he conceives, may be applied with peculiar advantage to foils generally, and not improperly, called four foils, containing green vitriol, arifing from the decompofition of pyrites. It will decompofe the metallic falt by fuperior affinity, and form with the acid Epfom falt, known in a high degree to promote vegetation; while the earth of iron will be feparated in the ftate of an ochre, or iron combined with fixable air."

In has been fuggefted by a writer, in the Farmer's Magazine, likewife, that he tried the vegetative power of this fubftance, by fowing oats in a pot containing one-tenth part of magnefia, and the reft common earth, in which they grew and throve extremely well; but in another pot containing magnefia alone, they would not vegetate at all, which might, he thinks, be expected. It is likewife fuppofed to extirpate forrel, when applied on lands that abound with it, probably by neutralizing the acid, which is the cafe with lime. This writer has, however, applied it to lands overgrown with forrel, without its producing fuch beneficial effects.

MAGNESIA, in *Chemiftry*, one of thofe fubftances that pafs under the general name of earths. It is lefs abundant in nature than lime, alumina, or filex, but more abundant than any of the other earths. It forms a confiderable part of the lime-ftone, commonly called magnefian, from which it may be obtained by diffolving the ftone in muriatic acid, and precipitating the magnefia with pure ammonia.

This earth was little known before its nature was inveftigated by the experiments of Dr. Black. It was before frequently confounded with lime.

It exifts, in combination with muriatic and fulphuric acids, in fea water. The latter falt is found in fome mineral waters, particularly the waters in the vicinity of Epfom, known by the name of Epfom falt.

It is from this falt that the magnefia of commerce is generally procured. The falt is firft diffolved in water; then to the clear folution a quantity of common carbonat of potafh is added. The magnefia is precipitated in the ftate of carbonat, which, when wafhed and dried, conftitutes the magnefia commonly ufed in medicine. It is fometimes expofed to a ftrong red heat, in crucibles, by which the carbonic acid is expelled. In this ftate it is called calcined magnefia.

If the precipitation be made with pure ammonia inftead of potafh, the earth will be obtained in a ftate of tolerable purity.

Magnefia, in a pure ftate, appears in the form of powder, foft to the feel, and perfectly white. It has no tafte, but when taken into the mouth it excites a peculiar fenfation, arifing from the rapid abforption of the faliva. It is deftitute of fmell, but emits a peculiar odour when moifture is applied to it. Its fpecific gravity, according to Kirwan, is 2.3. Like the alkalies, and the alkaline earths, it changes the blue colour of fome vegetables to that of green.

It does not undergo any rapid change by expofure to the air. It flowly combines with water and carbonic acid; the former may be detected by diftillation, and the latter by its effervefcence with an acid.

It is nearly infoluble in water; fince, according to Kirwan, it requires 7900 parts of water to diffolve one of magnefia.

Like the other earths, when ftrictly pure, it is not fufible at any known degree of heat, although it is capable of fufion when mixed with other earths. Lime and magnefia, in the proportion of four to one, runs through the crucible at 150° Wedgewood. But one of lime to four of magnefia did not melt at 165°. In the proportion of one of the latter to three of the former; they melted into a greenifh-yellow glafs. For thefe facts we are indebted to Kirwan.

Magnefia has long been fufpected to be a compound body, but not with much ground of probability, till the late interefting experiments by Mr. (fir Humphrey) Davy, in which the alkalies and fome of the earths appear to be compounds. Berzelius is faid to have fucceeded in decompofing magnefia by

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the agency of the Galvanic battery. The earth was placed in contact with mercury, and he supposed that the base of the magnesia, which was thought to be metallic, combined with the mercury, forming a peculiar alloy. Mr. Davy has repeated this experiment, with the sulphat of this earth, with a similar result. Attempts have since been made to decompose magnesia in various ways, by Guy Lussac and Thenard, but without any satisfactory result.

In the experiments of Mr. Davy, although he did not succeed in obtaining the metal from the alloy with mercury, he found that magnesia was produced by throwing the alloy into water. It is highly probable, therefore, that this earth, like lime and barytes, is a compound, a peculiar metal united with oxygen, between which the affinity may be so great as not to be obtained, but with great difficulty. It is, therefore, to future experiments that we must look for the final establishment of the compound nature of this earth.

It is an useful medicine for taking up acidity in the stomach; and has lately been recommended by Mr. Brandt as a solvent for the urinary calculus constituted by the uric acid.

Magnesia combines with sulphur, but very imperfectly: if two of the earth with one of sulphur be exposed to heat in a crucible, the mass becomes yellow. It affords a small quantity of sulphuretted hydrogen when thrown into water. If the heat at which it is formed be a little increased, the sulphur is expelled, leaving the earth pure. It does not combine with phosphorus, carbon, nitrogen, nor the metals, nor with any of the metallic oxyds.

There is no action between magnesia and the alkalies. The solubility of magnesia by the carbonats of the alkalies, is occasioned by the carbonic acid which leaves the alkali and combines with the earth.

Salts of Magnesia.—The greater proportion of the magnesian salts are of no known use, and have in consequence been little examined. The sulphat is the only one with which we are much acquainted, from its well known virtues as a purgative.

Sulphat of Magnesia.—This salt is found native in sea water; in the waters of Epsom, from which it has been called Epsom salt, and in many mineral waters. That used in medicine is obtained from the above sources. Several schistose stones contain sulphur and magnesia, which being exposed to air with moisture, the sulphur is converted into sulphuric acid, and, combining with the magnesia, forms this salt, which is separated from the heterogeneous matter by crystallization.

The efflorescence formed on brick walls is principally found to be sulphat of magnesia, sometimes mixed with nitre.

Sulphat of magnesia dissolves in its own weight of water at 60°. On evaporation and slow cooling, this salt crystallizes in the form of four-sided prisms; it has a bitter and disagreeable taste. The crystals have the property of double refraction. When exposed to the air they soon lose their water of crystallization, and appear in the form of white powder. When exposed to a strong heat, it first fuses in its water of crystallization, which soon escapes. If the heat be continued and raised to high temperature, it melts into a vitreous mass. It is composed, according to the analysis of Bergman, of 33 acid, 19 magnesia, and 48 water; according to Wenzel, 30.64 acid, 16.86 magnesia, and 52.5 water. Dalton makes the atom of magnesia to be 17, that of sulphuric acid 34. Then $\frac{34 + 17}{34} = \frac{100}{67.8}$, which gives 67.8 acid, and 32.2 magnesia. If we take the acid and base only, in the analysis of Wenzel we shall have $\frac{30.64 + 16.86}{30.64} = \frac{100}{64.5}$, or 64.5 acid, and 35.5 magnesia.

This salt has the property of combining with some other of the sulphats which form compounds, having peculiar properties. These, like the rest of the compounds called triple salts, perhaps in all cases, owe their existence to the circumstance of their crystallizing together, from the analogous form of their crystals, and ought not to be considered as distinct species, since on analysis they are found to consist of certain proportions of the two salts, rather than of two bases united to one common quantity of acid. There is little doubt but that these salts, when in solution, would possess the individual properties of the two salts, being in this situation a mere mixture.

The sulphat of magnesia and potash is said to be composed of three parts of sulphat of potash, and four of sulphat of magnesia. The crystals are of a rhomboidal form.

The sulphat of magnesia and soda is composed of six of sulphat of magnesia, and five of sulphat of potash. Its crystals are prismatic.

Sulphat of Magnesia and Ammonia is in the form of octahedrons, and consists of 68 of sulphat of magnesia, and 32 of sulphat of ammonia.

Nitrat of Magnesia.—This salt is formed by saturating the nitric acid with magnesia. On evaporating the solution to a certain extent, and suffering it to cool, the salt crystallizes in the form of rhomboidal prisms, which, when small, have the appearance of needles. The taste of this salt is unpleasantly bitter, like most other of the magnesian salts. It dissolves in its own weight of water at 60°; it is also soluble in nine times its weight of alcohol of the specific gravity of .84. When evaporated to dryness, and exposed to the air, it speedily becomes liquid, by attracting moisture from the air.

When exposed to a strong heat, it affords oxygen and nitrous oxyd, the acid being decomposed, leaving the earth behind in a state of purity.

Its composition by the analysis of Bergman is 43 acid, 27 magnesia, and 30 water; by Richter's, 69.6 acid, and 30.4 base; by Kirwan's, 46 acid, 22 base, and 32 water; and by Wenzel, 72 acid, and 28 base.

The weight of the atom of acid is 19, that of the base 17. Then, since the nitrats are super salts, we have $\frac{17 + 19 \times 2}{19 \times 2} = \frac{100}{69}$, or 69 acid, and 31 magnesia, nearly.

Muriat of Magnesia.—This salt abounds in sea water, and in some mineral waters. It may also be formed by adding carbonat of magnesia to muriatic acid, till the effervescence ceases. When the solution is evaporated to the consistence of syrup, and exposed to a temperature of 32°, crystals of a needle shape are formed, although in small quantity and with difficulty.

It has a pungent bitter taste. It is soluble in one-half its weight of cold water, and in almost any proportion of boiling water. It is also very soluble in pure alcohol.

This salt is very deliquescent from its great attraction for moisture. In consequence of the same property, a portion of it is evaporated with the water in which it is dissolved, when exposed to a boiling heat. It is decomposable by heat, the acid being expelled.

By the analysis of Kirwan, its composition is 34.59 acid, 31.7 base, and 34.34 water. By Wenzel's, 57 acid, and 43 base. The atom of muriatic acid being 22, we have

$\frac{22 + 17}{22} = \frac{100}{56.4}$, the acid is therefore 56.4, and 43.6 baſe. The acid and baſe of Kirwan's analyſis, reduced to the 100, will be 52 acid, and 48 baſe.

Hyperoxymuriat of Magneſia.—When the oxymuriatic acid gas is paſſed through a mixture of water and magneſia, we do not obtain an oxymuriat, but the common muriat mixed with the hyperoxymuriat. This ſalt has ſimilar properties to thoſe of the hyperoxymuriat of lime, the ſubſtance at preſent in uſe for bleaching.

Phoſphat of Magneſia.—This ſalt may be formed by directly adding the baſe to the acid, as in the muriat of magneſia; or it may be formed more perfectly, by adding a ſolution of ſulphat of magneſia to a ſolution of an equal weight of phoſphat of ſoda. In a few hours, the ſalt in queſtion will appear in beautiful tranſparent cryſtals.

Theſe cryſtals are in the ſhape of hexagonal priſms, ſoluble in 15 parts of water at 60. It has but little taſte. When expoſed to dry air, it ſoon loſes its water of cryſtallization, and aſſumes the ſtate of white powder. It is not decompoſed by heat, but melts and becomes vitreous.

A compound ſalt, denominated the *phoſphat of magneſia* and *ammonia*, has been found by Fourcroy in the calculous concretions found in the colon of the horſe.

It may be prepared by mixing ſolutions of the two ſalts together. A ſalt of difficult ſolubility is precipitated. This ſalt is found to be an ingredient of urine, and will appear in cryſtals, when that fluid is expoſed in cloſe veſſels for ſome time. It is partly from this ſalt that phoſphorus is obtained by the diſtillation of urine. The ammonia is given out, leaving the phoſphoric acid, which is deprived of its oxygen by the carbonaceous matter of the urine.

According to the analyſes of Fourcroy and Vauquelin, it is compoſed of 33 phoſphat of ammonia, 33 phoſphat of magneſia, and 33 water.

Fluat of Magneſia.—When magneſia is added to the fluoric acid, by a little at once, it is for ſome time diſſolved, but as it approaches ſaturation, it falls down in the ſtate of white powder. This ſhews that the ſalt is ſoluble in exceſs of acid. In its neutral ſtate, it is inſoluble in water. No analyſis has been given of this ſalt. It ought, however, to be compoſed in the neutral ſtate, of 15 acid to 17 acid, or by the 100 it will be $\frac{15 + 17}{15} = \frac{100}{47}$, or 47 acid and 53 baſe.

Borat of Magneſia.—This ſalt may be formed by diſſolving magneſia in boracic acid. It affords cryſtals by evaporation. It diſſolves ſparingly in water, and is ſoluble in acetic acid. Alcohol is ſaid to diſſolve the boracic acid from it, while the earth falls down. This ſalt is found native in Germany. It has the property of becoming electrical by heat; the truncated angles being plus, and the oppoſite ones minus.

Carbonat of Magneſia.—This ſalt may be formed by adding a ſolution of carbonat of potaſh to ſulphat of magneſia. A white powder is precipitated, which, when waſhed and dried, conſtitutes the magneſia uſed in medicine. (See Carbonat *of Magneſia.*) It is ſlightly ſoluble in water, at leaſt more ſo than the earth itſelf. If, however, the ſupercarbonat of potaſh be added to the ſolution of ſulphat of magneſia, a ſupercarbonat of magneſia will be formed, which is more ſoluble and capable of cryſtallization by evaporation, their form being that of hexagonal priſms. It is ſaid to be ſoluble in 48 parts of cold water, but leſs ſoluble in hot water. It is, however, in all likelihood much more ſoluble when it is firſt formed, or when the decompoſition of the ſulphat takes place by the ſupercarbonat of potaſh. There appears much inconſiſtency in the analyſis by different chemiſts. The carbonat by theory ſhould conſiſt of 19.4 acid, to 17 baſe, or in the 100, 53.3 acid, and 46.7 baſe. The ſupercarbonat conſiſts of 2 × 19.4 acid, and 17 baſe. In the 100, 69.5 acid, and 30.5 magneſia.

Acetat of Magneſia.—This ſalt may be directly formed, by diſſolving magneſia in the acetic acid. It does not cryſtallize when evaporated to dryneſs, it ſoon attracts moiſture from the air. It is very ſoluble both in water and alcohol.

Its component parts, according to Richter, are 70.65 acid, and 29.35 baſe.

Oxalat of Magneſia.—This ſalt is nearly inſoluble in water as well as alcohol.

Tartrat of Magneſia.—The tartaric acid diſſolves magneſia, forming a ſalt which cryſtallizes in needles.

Citrat of Magneſia.—This ſalt may be formed like the laſt, by adding the baſe to the acid. It does not afford cryſtals. It is compoſed of 66.66 acid, and 33.34 baſe.

Malat of Magneſia is a deliqueſcent ſalt.

Camphorat of Magneſia.—When magneſia is boiled with cryſtals of camphoric acid in water, they unite, forming a ſalt, which, on evaporation and cooling, falls down in ſmall ſcales. The reſt of the magneſian ſalts are not known to be of any importance.

Magnesia *Alba*, P. L. 1787, *Magneſiæ Carbonas*, or *Carbonate of Magneſia*, in the *Materia Medica*, a fine white powder, which formerly at Rome bore the name of the Count of Palma; though many are of opinion, that the preparation was carried from Germany into Italy. It was, however, for ſeveral years, a celebrated ſecret, in poſſeſſion of ſome particular perſons, till the method of preparing it was made public by Lanciſi in the year 1717, and afterwards by Hoffman in 1722. It was then extracted from the mother-ley, or the liquor which remains after the cryſtallization of rough nitre; either by precipitation with a ſolution of fixed alkaline ſalt, or by evaporating the liquor, and calcining the dry reſiduum, ſo as to diſſipate the acids by which the earth had been made diſſoluble. As quick-lime is commonly much employed in moſt of the German, French, and other European nitre-works, the ſubſtance obtained from the mother-leys of thoſe works is rather a calcareous earth than magneſia, and appears to be ſuch by its burning into quick-lime, and forming a ſelenites with the vitriolic acid. Magneſia was called the *miraculum chemicum*, becauſe from two pellucid liquors a coagulum is formed, which contains this ſubſtance.

From the experiments of Dr. Black, related in the Edinburgh Phyſ. and Lit. Eſſ. vol. ii. art. 8. we learn, that magneſia is ſoluble, with effervеſcence, in vitriolic, nitrous, marine, and acetous acids; forming, with the vitriolic acid, cryſtals ſimilar to thoſe of the Epſom ſalt, and with the nitrous acids, cryſtals which deliquated in a moiſt air: with marine acid it formed no cryſtals; but the ſaline matter being evaporated to dryneſs, ſoon deliquated by expoſure to air: with diſtilled vinegar it formed no cryſtals by evaporation, but a ſaline maſs, viſcid when warm, reſembling glue in colour and conſiſtence, and brittle when cold. Magneſia was found to loſe, by calcination, ſeven-twelfths of its weight, and was thus deprived of the power of effervеſcing with acids; whence the ſubſtance loſt by calcination was gas, or fixable air: nevertheleſs this gas, and almoſt the whole weight loſt by calcination, were reſtored to it by ſolution in vitriolic acid, and precipitation from them by a mild fixed alkali, the gas of which it abſorbed: in this laſt re-

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fpect it feemed analogous to the calcareous earths, but differed from them in other properties; particularly in thefe, that when calcined, it was not foluble in water, nor communicated any fenfible impregnation to it, and that it did not, like them, when calcined, become cauftic or acrid.

Dr. Black alfo found, that magnefia was precipitated from acids by volatile alkali; that, when uncalcined, it precipitated calcareous earth from acids; but when calcined, or in any other way deprived of its gas, it did not precipitate thefe earths: when uncalcined or united with gas, it precipitated lime from lime-water; which fhews that the calcareous earth had a ftronger power to combine with the gas, than the magnefia had, fince the former earth took this gas from the latter; by which means the former was rendered mild and unfoluble in water, and therefore was precipitated. This property fuggefted to Dr. Allton a method of procuring fweet water at fea, by adding magnefia to water, the putrefaction of which has been prevented by the previous addition of quick-lime. M. Monnet obferves, that magnefia, combined with fulphur, generally invelopes ftrata of coal: M. Margraaf has difcovered that the ferpentine earths in Saxony contain magnefia: and M. Monnet adds, that the marly and alfo the alum earths contain it.

The directions for preparing it, given in the laft London Pharmacopeia, are as follow: Take of fulphat of magnefia, fubcarbonat of potafs, of each a pound, and water three gallons. Diffolve the fubcarbonat of potafs in three pints of the water, and ftrain; diffolve alfo the fulphat of magnefia feparately in five pints of the water, and ftrain: then add the reft of the water to the latter folution; apply heat, and when it boils, pour in the former folution, ftirring them well together; next ftrain through a linen cloth; laftly, wafh the powder repeatedly with boiling water, and dry it upon bibulous paper in a heat of 200°. The double decompofition of the falts ufed in this procefs yields carbonat of magnefia and fulphat of potafs, the firft of which it is the object to collect as free as poffible from the laft. Hence, as the newly formed fulphat of potafs requires a large proportion of water for its folution, fuch a proportion is directed in the firft inftance, and it is afterwards well wafhed with more. If water be impregnated with carbonic acid gas, it will diffolve carbonat of magnefia; and hence the liquor is made to boil, for the purpofe of detaching it. If the two folutions be mixed cold, and the precipitate left for fome days upon the filter without artificial drying, many large and perfect cryftals of carbonat of magnefia will be formed in it. The fubfequent heat, by which the powder is dried, fhould not be great enough to detach any of the carbonic acid. The prefent procefs will yield a pure and elegant preparation: its form is that of a white powder, eafily friable, and, according to Fourcroy, if the bafe be fully faturated with carbonic acid, as in the cryftals, (for in its ordinary form it is a fubcarbonat,) 100 parts contain of carbonic acid 50, of magnefia 25, of water 25; and if not fo faturated, but in its ftate of fub-falt, of carbonic acid 48, of magnefia 40, and of water 12. In commerce, the muriat of magnefia contained in the refiduary liquor, after the cryftallization of muriat of foda from fea-water, is decompofed by a fimilar procefs, and yields a large proportion of the ordinary magnefia of the markets. The dofe of carbonat of magnefia to adults is from ʒß to ʒii, and of fulphat from ʒi to ℥i. See CARBONAT *of Magnefia*, and the preceding article.

Mr. Henry, an ingenious apothecary at Manchefter, has communicated the following procefs for making the magnefia. Diffolve any quantity of fal catharticus amarus in its own weight of water; filter and add to it by degrees a filtered folution of pearl or pot-afhes, in an equal quantity of water, ftirring them gently, until the mixed liquors have acquired the appearance of a complete coagulum; then defift from adding any more of the alkaline lixivium, and immediately throw the mixture into a large veffel of boiling water; keep it boiling for a quarter of an hour, then take it out, and put it into glazed earthen veffels; as foon as the powder hath fubfided, and before the water is quite cold, pour it off, and add a frefh quantity of boiling water: repeat thefe ablutions with hot water feveral times, till the liquor hath entirely loft its faline tafte: then let it be fo agitated as to fufpend the finer parts of the powder, in which ftate decant it into other veffels, and having feparated the water from the magnefia, by inclination, put it on large chalk-ftones, till a confiderable part of the humidity is abforbed; then wrap it up in fheets of white paper, and dry it before the fire. Pour hot water upon the remaining powder, ftir and decant it in its turbid ftate, and feparate the magnefia from the water as before: thus the whole, or moft of it, will be reduced to an equal degree of finenefs. The larger the quantity of water into which the precipitated powder is caft, the more fpeedily and perfectly will the vitriolated tartar, which is formed by the union of the alkali with the acid of the fal. cath. be wafhed off. The neutral falt fhould be wafhed off as quickly as poffible; otherwife, by allowing the mixture to ftand for fome time, the powder concretes into minute grains, which, when viewed with a microfcope, appear to be affemblages of needles diverging from a point. Thefe concretions cannot be re-diffolved by any wafhing, however long continued. Dr. Black orders four times the quantity of water to that of the folution for throwing the coagulum into; but Mr. Henry obferves, that this quantity is much too little. The water fhould be pure, and diftilled water is the beft, provided it be kept till its empyreuma is gone off. Hard or impure water makes magnefia coarfe and difagreeable. The chalk-ftones on which the magnefia is dried fhould be expofed to a moderate heat, that the moifture may evaporate quickly: and cleanlinefs fhould be particularly attended to through the whole procefs.

The magnefia is recommended by Hoffman, as an ufeful antacid, a fafe and inoffenfive laxative in dofes of a dram or two, and a diaphoretic and diuretic, when given in fmaller dofes of fifteen or twenty grains. It is now much in ufe, particularly in heart-burns, for correcting acidities in the primæ viæ, and for preventing or removing the many diforders to which children are fubject on this account. It is preferred to all common abforbents, on account of its laxative quality, which it manifefts when it meets with an acid in the ftomach and bowels. If it is mixed with rhubarb, it prevents the rhubarb from leaving a coftivenefs behind. If the magnefia is neither accompanied, nor met with by an acid, it is not purgative, but fimply abforbent.

Objection has been made to the ufe of magnefia by Hoffman and others, that it frequently produced flatulencies, gripings, and other uneafy fenfations, particularly in weak bowels. It is now well known, that thefe fymptoms muft have been produced by the great quantity of fixed air contained in it, and difcharged from it in confequence of its meeting and effervefcing with an acid in the ftomach or inteftines. Dr. Percival, therefore, fuggefted to Mr. Henry the idea of depriving it of its air, with a view of obviating thefe troublefome fymptoms occafionally attending the ufe of it. For this purpofe the magnefia fhould be calcined by putting it in a common crucible, placing it in a glowing fire, and keeping it red-hot for the fpace of two hours. The magnefia thus treated was found to be equally purgative,

tive, when given in half its former dofe, and is deprived, by this procefs, of the difagreeable qualities above mentioned, and acquires likewife new properties, which render it likely to anfwer fome other important practical purpofe. By calcination it is not only rendered incapable of generating air in the ftomach and bowels, but it is qualified to abforb, or render fixed, that which it finds there, and which is produced, fometimes in too great quantities, in the procefs of digeftion; and it is confequently adapted to relieve thofe colics or other diforders, which are commonly called flatulent. In this refpect it promifes, as Mr. Henry obferves, to be much more efficacious than the whole tribe of carminatives, from which it effentially differs with regard to its mode of operation and effects. It appears likewife to be the moft proper cathartic for patients afflicted with the ftone, who are under a courfe of the foap-ley; as it cannot, like the vegetable purgatives, counteract the lixivium, by throwing air into it; but, on the contrary, muft abforb a part of that air, which is already in the primæ viæ, and which would otherwife be attracted by the cauftic alkali, and render it lefs capable of acting on the calculus. In order to produce thefe effects, it is of great importance that the magnefia, intended for calcination, fhould be perfectly free from any admixture of calcareous earth; as in that procefs, this laft mentioned fubftance muft neceffarily be deprived of its air, or rendered cauftic; and the magnefia which contains it will accordingly impregnate the water in which it is infufed with the tafte and qualities of lime-water. Mr. Glafs's magnefia, which has been fo highly extolled, appears, by Mr. Henry's experiments, to contain no inconfiderable portion of calcareous earth. Lond. Med. Tranf. vol. ii. art. 16. Henry's Exp. and Obf. 1773.

Magnesia *Nigra*, in *Chemiftry*. See Manganese.

Magnesia, *Opalina*, *Opalin*, or ruby-coloured magnefia of antimony, is made, according to the directions of Lemery, of equal parts of antimony, nitre, and decrepitated fea-falt. It is a much weaker emetic than the liver of antimony.

Magnesia *Ufta*, P. L. 1787. *Magnefia*, in the *Materia Medica*, is prepared by burning four ounces of carbonat of magnefia in a very ftrong fire, for two hours, or until acetic acid, being dropped in, extricates no bubbles of gas. Here it may be noted that a definite quantity has been prefcribed merely for the fake of precifion, and not as influencing the quality of the product. This preparation was the "magnefia ufta" of the former Pharmacopeia; but as the term "magnefia" is correctly ufed to exprefs only the pure earth, fo it has been thought proper to apply it decidedly in the prefent inftance, although in common language, the fame term may be moft generally applied to the carbonat, and the epithet *calcined* added to exprefs the prefent preparation. The procefs depends upon the expulfion of the carbonic acid of the carbonat by heat, and in the form of gas, and hence the carbonat yields about half its weight, or rather 7,ths of the pure magnefia. It may be confidered as infoluble in water; for Kirwan ftates 7900 times its weight to be neceffary for this purpofe at 60. The dofe of magnefia for adults is from ʒß to ʒj.

Magnesia, in *Ancient Geography*, a province fituated on a peninfula E. of Theffaly, and S.E. of Macedonia; which fome geographers have annexed to the former country, and others have defcribed as part of the latter. Strabo and Pliny place this province in Macedonia, and in their time the Romans had annexed it to this country: but before the kings of Macedonia had extended their conquefts beyond mount Olympus, Magnefia was reckoned a portion of Theffaly. It had been denominated Æneonia and alfo Magnes campus. The peninfula on which it was fituated bounded on the S.W. the Sinus Pelafgiacus, the entrance of which formed a ftrait, having on the N.E. the Æantium promontorium in Magnefia, and to the S.W. the Antron in Phthiotis. Magnefia extended as far as mount Offa, and as fome fay, to the valley of Tempé; and M. d'Anville places to the N.W. of it, the country called Pelafgiotis. In Magnefia were found the following towns, *viz.* Magnefia, Phera now Sidero, Jerufat or Fanifar, Melibœa parva, Ileos, Demetrias now Demetriada, Pagafæ, and Tempe Theffala. Its mountains were Offa now Coffovo, and Pelion, and its promontories were thofe of Magnefia and Sepias.

Magnesia, the capital of the above province, fituated on the eaftern coaft, at the bottom of a fmall gulf.

Magnesia *ad Mæandrum*, a town of Afia Minor, in Ionia, on the northern bank of the Mæander; 15 miles S.E. of Ephefus. This, according to Diodorus Siculus, was one of thofe towns given by Artaxerxes to Themiftocles. According to Pliny, this town was a colony of Magnefians of Theffaly, united with the Cretans. The Turks call it "Guzel-Hifar," or the beautiful caftle.

Magnesia *ad Sipylum*, or *Magnefia Sipyli*, a town of Afia Minor, in Lydia, at the foot of mount Sipylus, S. of the confluence of the rivers Hyllus or Phrygius, and the Hæmus. The victory obtained by the Romans over Antiochus, near this city, rendered it famous. Strabo fays, that under the reign of Tiberius, it was deftroyed by an earthquake. Near it was a beautiful plain of the fame name, at the foot of mount Sipylus.

MAGNESITE. *Native Magnefia; Native Talc Earth*, Jam.; *Reine* or *Natürliche Talk-erde*, Wern.; *Magnefit*, Karften; *Magnéfie native*, Broch.; *Magnéfite de Mitchell*, Brongn.; *Magnefie carbonatée*, Haüy.

The following defcription is derived from the original native magnefia of Dr. Mitchell, and that of Piemont defcribed by Giobert. All the others we find mentioned by authors are dubious.

Colour yellowifh-grey, or a dirty-yellowifh white, that of Piemont blueifh-white before it has been much expofed to the air; that of Moravia is marked with blackifh-brown ftains, penetrating from the furface into the interior, as alfo marbled with grey and blueifh grey fpots.

It is always found maffive, generally in rounded pieces, fometimes of the fize of a man's head, and of earthy afpect: thefe pieces are fometimes found with fiffures, but not with rounded cells.

Its hardnefs variable; in its more compact ftate the Moravian variety fcratches calcareous fpar, but is fcratched by fluor fpar; the moft compact Piedmontefe varieties are ftill harder. It is alfo found in a friable ftate, when it foils the fingers.

Fracture flat conchoidal, approaching to even; dull.

Its tenacity is inconfiderable, efpecially in thofe varieties that contain no filica.

Fragments indeterminately angular, more or lefs fharp-edged.

It is generally perfectly opaque; fometimes very thin fragments are tranflucent at the edges.

It is fcarcely at all unctuous to the feel. It adheres to the tongue.

Specific gravity of the whitifh variety from Moravia, when penetrated by water, 2.881, and when not thoroughly faturated with it, 2.456; Haberle.

Magnefite is perfectly infufible before the blowpipe. In a ftrong heat it lofes its carbonic acid, contracts and acquires a fufficient a fufficient degree of hardnefs to fcratch glafs. It diffolves with effervefcence in concentrated acids; but Giobert informs us that the variety of Caftellamonte contains no carbonic acid when in the bofom of the earth; whence, as in all other refpects it is like the magnefia from Baudiffero, he is of opinion that alfo the latter is originally deftitute of carbonic acid, and that it only contains it, when, after a long expofure to contact with the air, it can abforb it from the atmofphere.

The following are the refults of the analyfes that have been lately given of the different varieties of this fubftance. Thofe of Hrubfchitz, in Moravia, according to the experiments of the accurate Bucholz, contain

Variety I.

Magnefia	-	0.48
Carbonic acid		0.52
		100

Variety II.

Magnefia	-	46.59
Carbonic acid		51.
Alumine	-	1.
Oxyd of iron and manganefe		0.25
Lime	-	0.16
Water	-	1.
		100.

Variety III.

Magnefia	-	45.42
Carbonic acid		47.
Silica	-	4.50
Water	-	2.
Alumine	-	0.50
Oxyd of iron and manganefe		0.50
Lime	-	0.08
		100. Ann. de Chem. tome 74.

The analyfes that were firft given by Mitchell, Lampadius, and Klaproth, of the Moravian magnefite, agree pretty exactly with thofe of Bucholz, but they all differ confiderably from that publifhed by Wondrafcheck, who obtained magnefia 33, carbonic acid 30, filica 8, lime 0.5, manganefe and iron 1 5, water 20, lofs 7.

Giobert and Guyton's analyfes of the Piemontefe magnefite again offer different refults. That of Baudiffero contained in hundred parts

Magnefia	-	68.
Carbonic acid		12.
Silica	-	15.6
Sulphate of lime		1.6
Water	-	3.
		100.2 Giobert.

And that of Caftellamonte

Magnefia	-	26.5
Carbonic acid		46.
Silica	-	14.2
Water	-	12.
Lofs	-	1.5
		100. Guyton.

The two known localities of magnefite are Hrubfhitz diftrict of Gromau, in Moravia; and Baudiffero and Caftellamonte, villages in the vicinity of Turin. The Moravian variety was brought by Dr. Mitchell from Vienna, and prefented to Werner, who gave it its prefent place in the fyftem. The Piemontefe varieties paffed a long time for pure alumine, till Giobert difcovered their true nature.

The geognoftic fituation of this foffil in either of the above countries, is nearly the fame. At Hrubfhitz it is found in a bed of decompofing ferpentine; accompanied with common and earthy talc, meerfchaum, and magnefian limeftone. That of Turin occurs in a fimilar ferpentine rock, accompanied, according to Giobert, by hornftone in decompofition, to which latter this chemift is inclined to afcribe the origin of the magnefite.

According to Giobert, the magnefite of Baudiffero forms an excellent porcelain with filex. He alfo made crucibles and capfules of it, having added fome of the argillaceous earth of Caftellamonte, fufficient to unite it into a pafte. The crucibles were expofed for 48 hours in the furnace of a glafs houfe; the earths did not appear to have formed a fufficient union; neverthelefs, the hardnefs of the crucibles was fuch that they could not be affected by the file.

It may alfo be employed with advantage for producing fulphat of magnefia by means of fulphat of iron, which likewife abounds in the fame places of Piemont.

MAGNET, Magnes, the *Loadftone;* a fort of ferruginous ftone, in weight and colour refembling iron ore, hard, fo as juft to afford fparks when ftruck with fteel, and heavy; endued with divers extraordinary properties, attractive, directive, inclinatory, &c.

The magnet is alfo called *lapis Heracleus*, from Heraclea, a city of Magnefia, a part of the ancient Lydia, where it is faid to have been firft found, and from which it is ufually fuppofed to have taken its name. Though others derive the word from a fhepherd named *Magnes*, who firft difcovered it with the iron of his crook on mount Ida. It is alfo called *lapis nauticus*, by reafon of its ufe in navigation; and *fiderites*, from its attracting iron, which the Greeks called σιδηρος.

The magnet is indeed a true iron ore, from which a confiderable portion of iron may be extracted, and is ufually found in iron mines, and fometimes in very large pieces, half magnet, half common ore. This fpecies of iron ore contains a greater quantity of iron, either in the metallic ftate, or not much oxygenated, than moft other ores. Neverthelefs, though every magnet feems to contain fome iron in a metallic ftate, it does not follow that every kind of ore, which contains iron in that ftate, is magnetic: many iron ores having been found, which had the appearance of being good magnets, and yet were not poffeffed of the magnetic properties. The natural magnets often contain, befides particles of iron, a portion of quartz and argil, and probably fome fulphur; whence they have, when made red hot, a fulphureous fmell; and alfo fome other fubftances. Magnets differ with regard to their fpecific gravity, according to the nature and proportion of the other ingredients which are

 mixed

mixed with the iron or martial part; but they are generally about seven times heavier than distilled water. The colour of the magnet is different, white, blue, red, black, but mostly ferruginous, or a dull brownish-black, according to the different countries it is brought from, the admixture of heterogeneous substances, and the state of the iron contained in them. Norman observes, that the best are those brought from China and Bengal, which are of an irony or sanguine colour; those of Arabia are reddish; those of Macedonia blackish; and those of Hungary, Germany, England, &c. of the colour of unwrought iron. Neither its figure nor bulk is determined, but it is found of all forms and sizes.

It has been observed, that, in general, those magnets which have a fine close grain, are more powerfully magnetic, and retain the virtue much longer than those that are of a coarser grain; and even longer than the artificial magnets which are made of steel.

The ancients reckoned five kinds of magnets, different in colour and virtue; the Ethiopic, Magnesian, Bœotic, Alexandrian, and Natolian. They also took it to be of two kinds, male and female; but the chief use they made of it was in medicine; especially for the cure of burns, and defluxions on the eyes. The moderns, more enlightened and happy, take it to conduct them in their voyages.

As the properties possessed by the natural magnet may be communicated to iron, steel, and other ferruginous substances, these bodies, after having acquired the magnetical properties, are called *Artificial* MAGNETS; which see.

The most distinguishing properties of the magnet, whether natural or artificial, are, that it attracts iron, and other ferruginous substances, thus serving the purposes of the chemist in discovering or separating small particles of iron, mixed with other matters; and that it points towards the poles of the world; that it is endued in certain cases with attractive and repelling powers; and in other circumstances, also dips or inclines to a point beneath the horizon, directly under the pole; and that it communicates these properties, by proper methods, to iron, steel, and other ferruginous substances. On which foundation are formed the mariner's needles; both the horizontal, and the inclinatory, or dipping-needles.

MAGNET, *the attractive Power of the* was known to the ancients, and is mentioned even by Homer, Pythagoras, Aristotle, and by Plato and Euripides, who call it the *Herculean stone*; because it commands iron, which subdues every thing else. The Jews were acquainted with it. This property is finely described by Pliny: "Quid lapidis rigore pigrius? Ecce sensus manusque tribuit illi. Quid ferri duritia pugnacius? Sed cedit, et patitur mores: trahitur namque a magnete lapide, domitrixque illa rerum omnium materia ad inane nescio quid currit; atque ut propius venit, assilit teneturque, complexuque hæret." Lib. xxxvi. cap. 16.

The ancients seem also to have been acquainted with the communicative virtue of the magnet. Plato has described a chain of iron rings suspended by one another, the first of which is sustained by the load-stone: Lucretius, Philo, Pliny, Galen, and Nemesius, have likewise described the same phenomenon; but the knowledge of its directive power, whereby it disposes its poles along the meridian of every place, and occasions needles, pieces of iron, &c. touched with it, to point nearly north and south, is of a much later date; though the exact time of its discovery, and the discoverer himself, are yet in the dark. The first tidings we hear of it are erroneously referred to the year 1260, when Marco Polo, the Venetian, is said by some to have introduced the mariner's compass (see COMPASS); though not as an invention of his own, but as derived from the Chinese, who are said to have had the use of it long before; though some imagine that the Chinese before that had borrowed it from the Europeans. Flavio de Gioia, a Neapolitan, and a citizen of Amalfi, is the person usually supposed to have the best title to the discovery, about the year 1302, and he, if not the inventor, was the first who used it for the guidance of vessels in the Mediterranean; and yet sir G. Wheeler mentions that he had seen a book of astronomy much older, which spoke of the use of the needle: though not as applied to the uses of navigation, but of astronomy. And in Guyot de Provins, an old French poet, who wrote about the year 1180, there is express mention made of the load-stone and the compass, and their use in navigation is obliquely hinted at. The Spanish Jesuit Pineda and Kircher affirm, that Solomon knew the use of the compass, and that his subjects did actually use it in their navigation. See COMPASS, *Mariner's*.

It appears from a Latin letter, written by Peter Adsiger, on the description of the nature of a magnet, and dated in 1269, from which Mr. Cavallo has made copious extracts in his "Treatise on Magnetism," 1800, that most of the properties of the magnet, with which we are now acquainted, were known in his time; though they were not applied to the same useful purposes. From these extracts we learn that the laws of magnetic attraction, and of the communication of that power to iron, the directive property of the natural magnet, as well as of the iron that has been touched by it, and even the declination of the magnetic needle, were particularly described by Adsiger with a view to the instruction of a friend. See *Mariner's* COMPASS.

MAGNET, *Variation of the*, or its declination from the pole, is said to have been first discovered by Seb. Cabot, a Venetian, in 1500, who first served our king Henry VII. then the king of Spain, and lastly returning to England, was constituted grand pilot by king Edward VI. with an annual salary of above 160*l.*; though Ferdinand, the son of Columbus, asserts that his father observed it on the 14th of September, 1492: and the variation of that variation by Mr. Gellibrand, an Englishman, who published his discovery in a small quarto pamphlet, intitled "A Discourse Mathematical on the Variation of the Magnetic Needle," printed in 1635. See the preceding article, and DECLINATION.

Lastly, the dip or inclination of the needle, when at liberty to play vertically, to a point beneath the horizon, was first discovered by another of our countrymen, Mr. R. Norman, who, in 1581, published the discovery he had long before made, in a small pamphlet, called the "New Attractive," where he shews how to determine its quantity. See DIPPING and DIPPING-*needle*.

MAGNET, *Phenomena of the*. 1. In every magnet there are at least two poles, one whereof points northward, the other southward; one of these is called the north pole, and the other the south, and that is called the north pole, which, if the magnet was put into a little boat of wood, or other materials large enough to support it, and set afloat in water, or so suspended by a thread, &c. as to be at liberty to move itself easily, would turn itself towards the north pole of the earth, or towards a point not much distant from it; and that is called the south pole which would turn, in similar circumstances, towards the south. The property itself is called the magnet's "directive power," or "magnetic polarity;" and when a magnetic body places itself in that direction, it is said to "traverse." A plane perpendicular to the horizon, and passing through the poles of a magnet when standing in their natural direction, is called the "magnetic meridian;" and the angle made by the magnetic meridian and the plane of the meridian of the place where the magnet stands, is called the "declination of the magnet," or more commonly the "declination

"declination of the magnetic needle;" becaufe the artificial magnets, commonly ufed for obferving this property, are generally made flender, and fomewhat in the fhape of a needle, or becaufe real fewing needles have been often ufed for this purpofe. The north pole of one magnet always attracts the fouth pole, when placed oppofite to one another, and repels the north-pole of another, and *vice verfà*. In fhort, magnetic poles of the fame name repel one another, whereas thofe of a different name attract one another. It is obferved that the poles of magnets are not at their extremities, but at a little diftance from thence; and if the magnet be divided into ever fo many pieces, the two poles will be found in each piece, and fometimes more than two; though each of the parts has not always the fame number of poles. The poles of the fragments generally, but not always, anfwer to the poles which were neareft to them in the original magnet. We may add, that in fome natural magnets there are more than two poles, inftances having occurred of fome in which there are eight, nine, and even ten. M. Mufchenbroek fays that he has feen a cube, each fide of which was polar. The figure, and alfo the heterogeneous nature of the magnets, are the principal caufes of their having often more than two poles. In order to determine the number and fituation of the poles in a magnet, let the various parts of its furface be prefented to one of the poles of another magnet that is freely fufpended; then thofe parts of the magnet which repel the other that is fufpended, have the fame polarity, and thofe which attract it have a different polarity. *E. G.* If the magnet be prefented to the north pole of the other fufpended magnet, then thofe parts of the former which repel the latter are poffeffed of a north polarity, and thofe which attract it are poffeffed of a fouth polarity.

By the following method alfo, the fituation of the poles, and the direction of the (fuppofed) magnetic effluvia in paffing out of the ftone, may be exhibited to the fight: let A B, C D, (*Plate* VI. *Magnetifm*, *fig.* 1.) be the poles of the ftone; about every fide gently ftrew fome iron or fteel-filings on a fheet of white paper; thefe fmall particles will be affected by the effluvia of the ftone, and fo difpofed as to fhew the courfe and direction of the magnetic particles in every part. Thus, in the middle of each pole between A B and D C, it appears to go nearly ftraight on; towards the fides it proceeds in lines more and more curved, till at laft the curve lines from both poles exactly meeting and coinciding form numberlefs curves on each fide, nearly of a circular figure, as reprefented in the diagram.

A fmall artificial magnet may be ufed in this experiment inftead of the real magnet, with a fimilar effect. If the table on which the paper refts receives a few gentle knocks, fo as to fhake the filings a little, they will the more readily difpofe themfelves round the magnetic bar; otherwife, the action of the magnet will not have power fufficient to difpofe properly thofe particles which lie at a confiderable diftance. This phenomenon, which has been obferved from time immemorial, has led various perfons to believe, that a certain fluid circulates from one of the poles of every magnet to the other, in confequence of which the iron or fteel-filings are thus arranged round the magnet. A little confideration will evince the abfurdity of this fuppofed circulation, becaufe if the fluid, of whatever nature it may be, did really circulate from one pole to the other, and had any action on the filings, thefe would be all driven toward that pole to which the moving fluid directed its courfe. The true caufe of the arrangement of the filings is, their becoming actually magnetic, and their two extremities being poffeffed of different polarities. Suppofe, firft, that only one oblong particle of iron be affixed to the various parts of the furface of the magnet, it is evident, from what has been already faid, that on the poles this particle of iron, A B, (*Plate* VI. *Magnetifm*, *fig.* 2.) would ftand perpendicular to the furface, becaufe its farther extremity B, having the fame polarity as the extremity, C, of the magnet, is equally repelled by it on every fide, and is far from the influence of the other extremity D; on the fides near to the poles the faid particle will ftand inclined, becaufe the fartheft pole of the magnet begins now to act upon it; and on the middle of the magnet the wire will lie quite clofe to it, or, if it be kept at fome diftance, will lie parallel to the magnet, becaufe the two poles of the magnet, being equidiftant from the extremities of the iron particle, have an equal action upon it. Now, when there are many particles of iron, *viz.* the filings, near the magnet, thofe particles which touch its furface are rendered magnetic, confequently they attract other particles, and thefe being made alfo magnetic, attract others, and fo on; forming ftrings of fmall magnets, which gradually decreafe in power as they recede from the magnet. As each of thefe particles has two magnetic poles, by a little confideration it will appear, that the fartheft ends of thofe ftrings or lines which proceed from the parts adjacent to one of the poles of the magnet, for inftance, the north, are likewife poffeffed of the north polarity, and the fartheft extremities of thofe ftrings which proceed from the parts adjacent to the fouth pole of the magnet, are poffeffed of the fouth polarity; hence, when they come fufficiently near, they attract the extremities of the former ftrings, and confequently form the curves delineated on the figure.

The fituation of the poles may be alfo determined by placing over the magnet a very fine needle, which will ftand perpendicular over each pole, being more ftrongly attracted by it, and no where elfe.

When a magnet that is freely fufpended, has only two poles, it will place itfelf very readily in the magnetic meridian, or in that place in which other good magnets are wont to place themfelves; but when it has more than two poles, it may happen that thefe poles are fo fituated, as that the magnet will not traverfe; that is, it will have no directive power, and yet it will attract, repel, &c.

Two circumftances deferve to be noticed with refpect to magnets that have more than two poles. One is, that the parts adjacent to one pole are poffeffed of a contrary polarity; and the other is, that the number of poles of one denomination in a magnet is either equal to, or differs from, the number of poles of the other denomination by one; thus, if the magnet has four fouth poles, then it will have either four, three, or five north poles. It is obferved, that good magnets of an uniform texture and proper form, have only two poles, and they lie in oppofite parts of their furfaces, fo that a line drawn from the one to the other paffes through the centre of the magnet. The polarity of a magnet, however, muft not be underftood to refide only in two points of it; for, in reality, it is the half, or a great part of the magnet that is poffeffed of one polarity, *i. e.* has the property of repelling the contrary pole of another magnet; and the reft of the magnet is poffeffed of the other polarity; the poles being, therefore, thofe points in which that power is the ftrongeft.

In magnets, fuch as we have juft defcribed, the line between the two poles is called the "axis;" and a line formed all round the furface of the magnet by a plane, which divides the axis into two equal parts, and is perpendicular to it, is called the "equator of the magnet." Hence it appears, that philofophers have appropriated to the magnet the poles, the equator, the meridian, in imitation of the terraqueous globe; and to complete the fimilarity, magnets have been often

often made of a spherical shape, with the poles and the equator marked on their surfaces. When so shaped, they have been called "terrellas," *i. e.* small earths.

The poles. of any given magnetic body may be ascertained by presenting the various parts of its surface successively to one of the poles of a magnetic needle, and you will soon discover which parts of the given body are possessed of a contrary polarity, by the needle's standing perpendicularly towards them. Then present the various parts of the surface of the same body to the other pole of the needle, &c. The magnetic body, in this operation, should not be brought too near the needle, for fear of changing its polarity. The distance is various for producing such an effect, according to the strength of the magnetic body; so that it is impossible to state it; but the operator needs never mistake, if he keeps the magnetic body so far from the needle, as just to affect it sensibly.

2. These poles, in different parts of the globe, are differently inclined towards a point under the horizon. Thus, when a magnet is placed so as to be at liberty to move itself very easily, it generally inclines one of its poles towards the horizon, and of course it elevates the other above it. This property is called the "inclination" or "dipping" of the magnet, or more commonly of the "magnetic needle." See DIPPING.

3. These poles, though contrary to one another, do help mutually towards the magnet's attraction and suspension of iron.

4. If two magnets be spherical, one will turn or conform itself to the other, so as either of them would do to the earth; and after they have so conformed or turned themselves, they will endeavour to approach or join each other; but if placed in a contrary position, they will avoid each other. This property may be illustrated by placing two magnets on small pieces of wood, formed in the shape of boats, and swimming freely on stagnated water, undisturbed by wind, and at such a distance as to be within the sphere of each other's activity: both the boats will swim towards each other with an accelerated motion, and meet exactly in the middle of the distance between them, provided that the boats and magnets were exactly of the same weight and bulk: but if either boat be turned, so that its magnet may present a contrary end to that by which it was attracted by the other magnet, they will both recede from each other with an equal velocity. The same phenomenon may likewise be exhibited by suspending a magnet, C, from the end, B, of a balance (*Plate* VI. *Magnetism, fig.* 3), and forming an equilibrium with a weight in the scale A, place another magnet, D, under C, and C will be found to rush towards D, and to lift the weight in the scale A: but if the opposite end of D be presented to C, C will be repelled by it, ascend, and the scale, A, will descend: if D be placed above C, as in E, the effects will be just the contrary.

M. Muschenbroeck has found by a variety of experiments, that two magnets attract one another with different forces at different distances; that they act most strongly in mutual contact, in which case their force has been equal to the weight of three hundred and forty grains, but at the distance of twelve inches, equal only to twenty-three grains: nevertheless, they observe no regular proportion in their decrease, but the ratio is less than the inverse of their distances; and different in different magnets and at different times. There are some whose sphere of activity reaches even to fourteen feet, and others in which it is not sensible at the distance of eight or nine inches. He has also found, that the sphere of repulsion varies in different magnets, and at different distances; and that the repulsive force is much less than that of attraction; the latter in contact being equal to three hundred and forty grains, whereas the former is equal only to forty-four grains. It appears also from another experiment of the same author, that the repelling forces of both poles of the same magnet, are very considerable at the distance of twelve lines, being equal to thirty grains, that they increase to the distance only of seven lines, where they are equal to thirty-six, but that in immediate contact they are equal only to thirteen grains. Mr. Michell, however, differs much in his deductions from those abovementioned: he maintains, that each pole acts, attracts, or repels exactly equally, at equal distances in every direction; and that the magnetical attraction and repulsion are exactly equal to each other. He adds, that the mistake of those who think otherwise, arose from their not attending to the different degrees of strength, which magnets have in different circumstances: for two magnets that are placed with their attracting poles towards each other, will have their power, by that means, increased: and on the contrary, if their repelling poles be placed towards each other, their power will thereby be diminished: and this increase or diminution of power will be in a greater or less degree, according as the magnets are nearer to, or farther from, each other; whence in all the experiments made on this subject, the attraction and repulsion come perpetually nearer to an equality, the greater the distance of the two magnets is, with which the experiments are made, and *vice versâ.*

And so great is the effect of magnets on each other, that when the repellent poles of a large magnet and a small one are brought into contact, the small one shall sometimes have its repellency changed into attraction. Mr. Michell also infers from other experiments, that the attraction and repulsion of magnets decrease as the squares of the distances from the respective poles increase. The differences of opinion in this respect are ascribed by him to the want of making proper allowances for that property of magnets, in consequence of which they attract or repel equally at equal distances, together with the increase and diminution of power in the magnets with which the experiments were tried.

We shall here subjoin a few more observations on magnetic attraction and repulsion. If a piece of iron, or steel, or other ferruginous substance, be brought within a certain distance of one of the poles of a magnet, it is attracted by it so as to adhere to it with a considerable degree of force; and this attraction is mutual, the iron attracting the magnet as much as it is attracted by it; so that if they were placed on pieces of cork or wood and made to swim on water, the iron would be found to advance towards the magnet as well as the magnet towards the iron; and if the iron were kept steady, the magnet would move towards it. A smaller degree of attraction than that which is observed by means of water may be discovered by placing the given body to swim upon quicksilver, and by presenting the magnet to it; in which case it will move with surprising velocity. In this method the following particulars must be minded, *viz.* the aperture of the vessel, in which the quicksilver is kept, must be at least six inches in diameter; otherwise, as the surface of the quicksilver descends near the sides of the vessel, and that curvature is proportionably greater in narrow vessels than in larger ones, the floating body, when the quicksilver is kept in a vessel of three or four inches, will be perpetually running towards the sides. The quicksilver must be very pure; but, as it is very difficult to find it, or to preserve it pure, it must be frequently passed through a funnel of paper, *viz.* a piece of writing paper rolled up conically, and having a small aperture of about a fortieth of an inch in diameter; for, if the quickfilver be impure, the floating body will move with lefs facility upon it than upon water. The air about it muft not be difturbed much, in order to keep the body without motion; in which ftate one of the poles of a ftrong magnet is to be prefented on one fide of it, in the fame manner as when the experiment is tried on water, following the fame precautions. The force of magnetic attraction varies according to the ftrength of the magnet, the weight and fhape of the body prefented to it, the magnetic or unmagnetic virtue of that body, the diftance betweeen it and the magnet, and fome other circumftances. A piece of foft and clean iron is more powerfully attracted by a magnet than any other ferruginous body of fimilar fhape and weight. The iron ores are attracted more or lefs forcibly, as they contain a greater or lefs quantity of metallic particles, as that quantity is in a more or lefs perfect metallic ftate, and as it is of a fofter or harder nature; but all thefe, as well as hard iron and fteel, are lefs forcibly attracted than foft iron. By prefenting a piece of iron fucceffively to the different parts of the furface of a magnet, the attraction will be found ftrongeft at the poles of the magnet, or thofe points that are directed, when the magnet is freely fufpended, towards the north and fouth; it will be found to decreafe as the part towards which the iron is prefented recedes from the poles, and it will be very little, or not at all, perceptible about thofe parts of the furface which are equidiftant from the poles. The attraction, as we have already obferved, is moft powerful near the furface of the magnet, and is diminifhed in receding from it, fo that if a piece of iron be placed in contact with one of the poles of a magnet, it will require a certain degree of force to feparate them; at the diftance of an inch from the pole, the attractive power, though much diminifhed, will be perceptible; and at a greater diftance, it will be ftill weaker. However, the law of this diminution has not been fatisfactorily afcertained; fo that it is not known, whether it is twice, thrice, or any other number of times greater than at double that diftance. In fome cafes, the attraction has feemed to decreafe in the inverfe ratio of the diftances; but in others it has decreafed much fafter, or in different proportions at different diftances; and the only general conclufion that has been deduced from a variety of experiments is, that the decreafe of magnetic attraction is not flower than the inverfe ratio of the diftances, fo that at double the diftance it is half as ftrong, &c. In fome other experiments with magnetic needles, the attraction appeared to decreafe in the ratio of the cubes of the diftances. Mr. Whifton ftates, that the abfolute attractive power of different armed load-ftones is, *cæteris paribus*, according to the quantity, not of their diameters or folidities, but of their furfaces, or in a duplicate proportion of their diameters. Whereas, the power of good magnets unarmed, not fenfibly different in ftrength, fimilar in figure and pofition, but unequal in magnitude, is fometimes a little greater, fometimes a little lefs, than in the proportion of their fimilar diameters. He fays, that the load-ftone attracts needles that have been touched, and others that have not been touched, with equal force at unequal diftances; *viz.* where the diftances are to one another as five to two. According to his account, the attractive power of load-ftones, in their fimilar pofition to, but different diftances from, magnetic needles, is in the fefquiduplicate proportion of the diftances of their furfaces from their needles reciprocally; or as the mean proportionals between the fquares and the cubes of thofe diftances reciprocally; or as the fquare roots of the fifth powers of thofe diftances reciprocally. Thus the magnetic power of attraction, at twice the diftance from the furface of the load-ftone, is between a fifth and fixth part of that power at the firft diftance; at thrice the diftance, the power is between the fifteenth and fixteenth parts at four times the diftance, the power is thirty-two times as fmall; and at fix times the diftance, eighty-eight times as fmall. Where it is to be noted, that the diftances are not taken, as in the laws of gravity, from the centre; but from the furface: all experience affuring us, that the magnetic power refides chiefly, if not wholly, in the furfaces of the load-ftones and iron; without any particular relation to any centre at all. The proportion here laid down was determined by Mr. Whifton, from a great number of experiments of Mr. Haufkbee, Dr. Brook Taylor, and himfelf. The force they meafured by the chords of thofe arcs, by which the magnet, at feveral diftances, draws the needle out of its natural direction, to which chords (as he has demonftrated) it is ever proportional. The numbers in fome of their moft accurate trials he gives us in the following table; fetting down half the chords, or the fines of half thofe arcs of declination, as the true meafures of the power of magnetifm.

Diftance in Inches.	Degrees of Inclination.	Sines of half Arcs.	Rat. fefquidupl.
20	2	175	466
$14\frac{3}{5}$	4	349	216
13[illegible]	6	523	172
$12\frac{5}{6}$	8	697	138
$11\frac{1}{8}$	10	871	105
$10\frac{1}{4}$	12	1045	87
$9\frac{1}{4}$	14	1219	70

Sir Ifaac Newton fuppofes magnetic attraction to decreafe nearly in the triplicate ratio of the diftance. Mr. Martin obferves, that the power of his load-ftone decreafes in the fefquiduplicate ratio of the diftances inverfely. Dr. Helfham found it to be as the fquares of the diftances inverfely, which ratio agrees with that of the ingenious Mr. Michell; others, as Dr. Brook Taylor and Mr. Mufchenbroeck, are of opinion, that this power follows no certain ratio at all, but that it is much quicker at greater diftances than at fmall ones, and that it is different in different ftones. Mufchenbroeck has made the following experiments in relation to this fubject, and as they were accurately made, we fhall here annex them. Introd. Nat. Phil. c 19.

Exp. 1.—A cylindrical magnet, two inches long, and weighing 16 drams, was fufpended to one fcale of an accurate balance, and under it there was placed, upon a table, a cylinder of iron, which was exactly of the fame bulk and fhape. Things being thus prepared, the cylinder of iron was fucceffively placed at different diftances from the magnet, and at each diftance the degree of attraction between the iron and the magnet was afcertained by weights put in the oppofite fcale of the balance. The refults were as follows, *viz.*

Diftance in Inches.	Attractions in Grains.
6	3
5	$3\frac{1}{2}$
4	$4\frac{1}{2}$
3	6
2	9
1	18
0	57

Exp. 2.—A fpherical magnet, of the fame diameter as the cylindrical one ufed before, but of greater ftrength, was affixed to one of the fcales of the balance; and the cylindrical magnet, ufed in the preceding experiment, was placed upon the table, with its fouth pole upwards, and facing the north

north pole of the ſpherical magnet. In this diſpoſition of the apparatus, the attractions were found to be as follow:

Diſtance in Inches.	Attractions in Grains.
6	21
5	27
4	34
3	44
2	64
1	100
0	260

Exp. 3.—Inſtead of the cylindrical magnet, the cylinder of iron was placed upon the table, and under the globular magnet. The reſult was as follows:

Diſtance in Inches.	Attractions in Grains.
6	7
5	9½
4	15
3	25
2	45
1	92
0	340

Exp. 4.—Inſtead of the iron cylinder, a globe of iron of the ſame diameter as the ſpherical magnet was placed upon the table, and the attractions were found to be as follow:

Diſtance in Inches.	Attractions in Grains.
8	1
7	2
6	3½
5	6
4	9
3	16
2	30
1	64
0	290

From the ſecond and third experiments it appears, that, when in contact, a magnet attracts another magnet with leſs force than a piece of iron. This has been confirmed by many other experiments. But the attraction between two magnets begins from a greater diſtance than between the magnet and iron; hence it muſt follow a different law of decrement.

The attraction between a given magnet and a piece of iron, is ſubject to a variation ariſing from the weight and ſhape of the iron; there being a limit, in the weight and ſhape of the iron, in which the magnet will attract it more forcibly than either a greater or a ſmaller one: but this moſt advantageous weight and extenſion of the piece of iron can only be determined by actual experiment, it being various according to the various nature, ſtrength, and ſhape of the magnet, as well as of the iron.

Magnetic attraction takes place between the magnet and ſuch ferruginous bodies as were not magnetic before, or between the contrary poles of two magnets: but when two magnets are placed with their poles of the ſame name toward each other, then, inſtead of attracting, they repel each other. However, it often happens, that though the north pole of one magnet be placed near the north pole of another magnet, or the ſouth pole of the one be placed near the ſouth pole of the other, yet they attract each other: and ſometimes they ſhew no attraction nor repulſion.

In order to reconcile this apparent contradiction, it is neceſſary to mention firſt another phenomenon, which takes place whenever a piece of ferruginous ſubſtance is brought near a magnet; and which indeed is the foundation of, and ſerves to explain a great many, other appearances, otherwiſe unintelligible, in the ſcience of magnetiſm.

The phenomenon, in ſhort, is thus: when a piece of iron, or any other ſubſtance that contains iron, is brought within a certain diſtance of a magnet, it becomes itſelf a magnet, having the poles, the attractive power, and in ſhort every property of a real magnet. That part of it which is neareſt to the magnet acquires a contrary polarity: thus, if an oblong piece of iron, A B, be brought within a proper diſtance of a magnet, ſo that the extremity, A, of the iron may be oppoſite the north pole of the magnet, then this ſame extremity, A, will become a ſouth pole, and the other extremity, B, will become a north pole.

The magnetiſm acquired by being placed within the influence or the ſphere of activity of a magnet, in ſoft iron laſts only whilſt the iron continues in that ſituation, and when removed from the vicinity of the magnet, its magnetiſm vaniſhes immediately; but with hard iron, and eſpecially with ſteel, the caſe is quite different; for the harder the iron or the ſteel is, the more permanent is the magnetiſm which it acquires from the influence of a magnet; but it will be in the ſame proportion difficult to render it magnetic. If, for inſtance, a ſoft piece of iron and a piece of hard ſteel, both of the ſame ſhape and ſize, be brought within the influence of a magnet at the ſame diſtance, it will be found that the iron will appear much more magnetic than the ſteel; but if the magnet be removed, the ſoft iron will inſtantly loſe its magnetiſm, whereas the hard ſteel will preſerve it for a long time.

From theſe obſervations two conſequences are evidently deduced, *viz.* firſt, that there is no magnetic attraction but between the contrary poles of two magnets; for the iron, or other ferruginous body, that is preſented to the magnet, muſt become itſelf a magnet before it be attracted: and ſecondly, it appears why a magnet muſt attract a piece of ſoft iron more forcibly than hard iron, and much more than hard ſteel, *viz.* becauſe the hard iron, and more eſpecially the hard ſteel, does not become ſo ſtrongly magnetical as ſoft iron, when preſented to a magnet.

We may now reſume the ſubject of magnetic repulſion, and ſhew why the magnetic poles of the ſame name may repel, attract, or not act at all, upon one another.

Indeed, the law of repulſion being always exerted between magnetic poles of the ſame name, nearly as ſtrong as the attraction between thoſe of different name, remains certain and immutable; but it often happens, that one of the magnets, being more powerful than the other, will change the pole of that other magnet, in the ſame manner as it gives magnetiſm to any other piece of iron which is expoſed to its influence, and then an attraction will take place apparently between magnetic poles of the ſame names; though in fact it is an attraction between poles of different names, becauſe one of them has been actually changed. Thus, ſuppoſe that a powerful magnet be placed with its north pole very near the north pole of a weak magnet; it will be found, that inſtead of repelling, they will attract each other, becauſe that part of the weak magnet, which before was a north pole, has been changed into a ſouth pole by the action of the ſtrong magnet.

As thoſe bodies which are poſſeſſed of any magnetiſm cannot be very readily affected by the influence of another magnet, for the very ſame cauſe which renders them capable of retaining any magnetiſm at all, namely, the hardneſs; and, as the power of a magnet diminiſhes in proportion to the diſtances from its ſurface, it follows, that when the north or ſouth pole of a weak magnet is from a conſiderable diſtance, gradually brought near the like pole of a powerful

magnet,

magnet, the pole of the weak magnet cannot be changed very eaſily; hence, beyond a certain diſtance, *viz.* before the ſaid pole be changed, the two magnets muſt exert a repulſion againſt each other; but when the ſmall magnet has been brought ſo near the powerful one, as that its pole may begin to be changed, then neither an attraction nor a repulſion will take place; and when the two magnets are approached nearer than that limit, then, the pole of the weak one being changed, an attraction will enſue.

After theſe obſervations, the ingenious reader may eaſily imagine that the decreaſe of repulſion between homogeneous magnetic poles muſt be at leaſt as much, if not more irregular than the decreaſe of the attraction at different diſtances. It is likewiſe evident, that many objects muſt be had in view, in attempting to inveſtigate the law of that decreaſe.

5. If a magnet be cut through the axis, the parts or ſegments of the ſtone, which before were joined, will now avoid and fly each other. 6. If the magnet be cut by a ſection perpendicular to its axis, the two points which before were conjoined, will become contrary poles; one in one, the other in the other ſegment. 7. Iron is not only attracted by a magnet, even more than another magnet, and equally attracts it, but alſo receives virtue from the magnet by application to it, or barely from an approach near it, though it do not touch it; and the iron receives this virtue variouſly, according to the parts of the ſtone it is made to touch, or even but to approach to; the part of the iron or ſteel which is neareſt to the magnet acquiring the contrary polarity, &c. In order to communicate the magnetic virtue more effectually, the following methods are made uſe of: *viz.* it has been diſcovered, that iron rubbed upon one of the poles of the magnet acquires much greater virtue than from any other part of it; and this is more conſiderable from an armed magnet than from a naked one. Farther, the more gently the iron is preſſed, and the more it is preſſed againſt the pole, the more magnetical it becomes. Again, it is more convenient to impregnate iron on one pole, than on both ſides ſucceſſively; becauſe the iron receives magnetic virtue from each pole, in contrary directions, which deſtroy each other's effects. Moreover, the iron is much better impregnated by preſſing it uniformly and in the ſame direction, according to its length, than by rubbing it by the middle; and the extremity which touches the pole laſt, retains the greateſt virtue: it is alſo of importance, that the length of the iron be conſiderable. Beſides, a piece of poliſhed ſteel, or of pointed iron, receives more virtue than mere iron, or iron of the ſame figure: and, *cæteris paribus*, a piece of iron that is long, ſmall, and pointed, is more ſtrongly impregnated than that of any other form. 8. If an oblong piece of iron be any way applied to the ſtone, it receives virtue from it, only as to its length. 9. The magnet loſes none of its own virtue by communicating any to the iron, but has it rather improved; though this is doubted by Mr. Savery; and this virtue it can communicate to the iron very ſpeedily; though the longer the iron touches or joins the ſtone, the longer will its communicated virtue remain in it; and a better magnet will communicate more of it, and ſooner, than one not ſo good.

It is obvious that when the iron, ſteel, or any ferruginous body is applied in contact with the magnet, it acquires a ſtronger power than if it be placed at ſome diſtance from its ſurface. A magnet can never communicate a greater power than itſelf poſſeſſes, or even an equal degree of it; but ſeveral magnets, of nearly an equal degree of magnetiſm, when joined together, have a ſtronger power than one of them ſingly: hence, in order to impart a ſtrong magnetic power to a given body A, by means of a weak magnet B, we muſt firſt render ſeveral bodies, C, D, E, F, &c. weakly magnetic; and then, by properly joining C, D, E, F, &c. together, we may communicate to another body, or ſeveral other bodies, a ſtronger magnetiſm, till, at laſt, we ſhall be able to communicate to A the required degree of magnetic power.

The late Dr. Gowin Knight practiſed a method, which he never publiſhed, of communicating to iron a very conſiderable magnetic virtue, and alſo of increaſing that of feeble magnets. From a report delivered to the Royal Society in 1744, it appears that he had prepared a ſmall eight-corned bar of ſteel, three inches and almoſt $\frac{7}{10}$ths long, and about half an ounce troy in weight, which lifted by one of its ends about eleven of the ſame ounces; that another plain bar of ſteel, of a parallelopiped form, $5\frac{9}{10}$ inches long, $\frac{4}{10}$ths of an inch broad, and $\frac{2}{10}$ths of an inch thick, weighing 2 ounces $8\frac{1}{2}$ penny-weights, lifted, in like manner, by one of its ends, twenty troy ounces; that a ſteel bar, almoſt of the ſame form as the laſt, but only four inches in length, capped or armed with iron at each end, cramped with ſilver, and weighing all together one ounce fourteen penny-weights, lifted by the feet of the armour full four pounds troy; and that a ſingle block of ſteel, of a parallelopiped form, almoſt four inches long, $1\frac{2}{10}$ high, and $\frac{4}{10}$ths of an inch thick, armed with iron, cramped with braſs, and ſuſpended by a ring of the ſame, and weighing all together fourteen ounces one penny-weight, lifted by the feet of the armour 14 pounds $2\frac{1}{2}$ ounces troy weight. He alſo exhibited a compound artificial magnet, conſiſting of twelve bars of ſteel armed, which lifted by the feet of the armour, as the laſt, 23 troy pounds $2\frac{1}{2}$ ounces. At the ſame time he preſented before the Society a ſmall armed load-ſtone, which, with its armour, weighed ſeven penny-weights fourteen grains, and which could ſcarcely lift two ounces; but improved by his method, it ſuſtained ſix ounces eighteen penny-weights and three grains. See *Armed* MAGNET, and *Artificial* MAGNET.

10. Iron will receive magnetiſm more eaſily than ſteel; the ſoft ſteel receives it much more eaſily than the ſpring-tempered, and the ſpring-tempered much more eaſily than the hard: but a piece of ſpring-tempered ſteel will not retain near ſo much magnetiſm, and is therefore incapable of being excited to the ſame degree as hard ſteel; ſoft ſteel will retain it ſtill leſs; and iron, which is the ſofteſt of all, and in which the acquired magnetiſm is the ſtrongeſt, ſcarcely retains any, when it is removed from the influence of the magnet. Other ferruginous bodies preſerve it for a longer or ſhorter time, according as they participate more of the nature of hard ſteel, or of that of ſoft iron. Mr. Michell has evinced the truth of theſe obſervations both by reaſoning and experiment. There are other bodies, beſides iron and ſteel, which are ſuſceptible of magnetiſm; theſe are probably no other than iron in ſome ſhape or other, or bodies that have a mixture of them: ſuch are all ſorts of iron ore after ignition, and ſome before. It is obſervable, that ſeveral of the hard ores of iron, which are not affected in the leaſt by the magnet in their natural ſtate, are vigorouſly attracted by it when moderately roaſted; that the calces of iron, by ſlight roaſting with inflammable additions, are made to obey the load-ſtone, and revived into their metallic form, each particle appearing now to be perfect iron; whilſt the calces of other metals are in no degree revived, without being brought into fuſion.

The ores of iron are attracted more or leſs readily, according as they contain a greater or a ſmaller quantity of metal, and as that metal is in a more or leſs perfect metallic ſtate. By the action of fire, iron ores are generally put into a ſtate

a ſtate

a ftate of being much more readily attracted. The fcales which are feparated from the furface of red-hot iron when hammered, and the particles of burnt fteel that are produced from the collifion of a flint and fteel, are attracted by the magnet nearly as well as pieces of good iron that equal them in bulk. The black calx of iron is attracted very weakly. The red calx, or ruft, whether it be produced by the action of acids, of fire, or by expofure to the atmofphere, is attracted very little; but it never becomes quite infenfible of the magnet's action, though it be repeatedly wafhed and purified. It is obfervable, that a quantity of iron is attracted with the leaft force, when reduced into the fmalleft bits, or fineft powder. The ores of other metals are generally, though weakly, attracted by the magnet, thus indicating that they contain fome iron: fuch are the ores of lead, of tin, and of copper. Native cinnabar is likewife attracted; but the factitious cinnabar is not. The pure metals are not attracted. Of the pure metals, zinc, bifmuth, and particularly cobalt, as well as their ores, are almoft always attracted by the magnet. Antimony, unlefs it be firft expofed to a gentle fire, is not attracted. Arfenia is not attracted at all. A certain fort of bifmuth poffeffes a fingular property of being repelled on every fide by the magnet. The other minerals, befides the metallic, are almoft all attracted by the magnet, at leaft after having been expofed to the action of fire. Of the pure earths, the calcareous is leaft, or not at all, and the filiceous the moft frequently, attracted.

There are alfo feveral forts of heavy, fhining, opaque, black, or dark chocolate-coloured fand, moft of which, if not all, are iron ores, which are fufceptible of magnetifm. Of this kind is the dark-brown fand in emery: we may alfo refer to this clafs moft brafs, and feveral other metals; and bricks that have been much burnt in the fire. The magnetifm of thefe is probably owing to a fmall quantity of iron mixed with them. What is in the brafs, Mr. Michell conjectures, may come from the lapis calaminaris, which is faid to have often a fmall mixture of iron in it; but Mr. Arderon, who has fucceeded in giving magnetifm and polarity to brafs, has doubts as to the mixture of iron with brafs: particularly, becaufe brafs fluxes with a much lefs degree of heat than iron, and iron naturally fwims in fluid brafs. Phil. Tranf. vol. l. p. 774.

Mr. Cavallo made feveral experiments, with a view of afcertaining the magnetifm of brafs, and inveftigating the caufe of it. The refult is as follows: It appears, he fays, "1ft. That moft brafs becomes magnetic by hammering, and lofes the magnetifm by annealing or foftening in the fire, or at leaft its magnetifm is fo far weakened by it, as afterwards to be only difcoverable when fet afloat on quickfilver.

"2dly. That the acquired magnetifm is not owing to particles of iron or fteel imparted to the brafs by the tools employed, or naturally mixed with the brafs.

"3dly. Thofe pieces of brafs which have that property, retain it without any diminution after a great number of repeated trials, *viz.* after having been repeatedly hardened and foftened. But I have not found any means of giving that property to fuch brafs as had it not naturally.

"4thly. A large piece of brafs has generally a magnetic power fomewhat ftronger than a fmaller piece; and the flat furface of the piece draws the needle more forcibly than the edge or corner of it.

"5thly. If only one end of a large piece of brafs be hammered, then that end alone will difturb the magnetic needle, and not the reft.

"6thly. The magnetic power which brafs acquires by hammering has a certain limit, beyond which it cannot be increafed by farther hammering. This limit is various in pieces of brafs of different thicknefs, and likewife of different quality.

"7thly. Though there are fome pieces of brafs which have not the property of being rendered magnetic by hammering, yet all the pieces of magnetic brafs, that I have tried, lofe their magnetifm, fo as no longer to affect the needle, by being made red-hot; excepting indeed when fome pieces of iron are concealed in them, which fometimes occurs: but in this cafe, the piece of brafs, after having been made red-hot and cooled, will attract the needle more forcibly with one part of its furface than with the reft of it; and hence, by turning the piece of brafs about, and prefenting every part of it fucceffively to the fufpended magnetic needle, one may eafily difcover in what part of it the iron is lodged.

"8thly. In the courfe of my experiments on the magnetifm of brafs, I have twice obferved the following remarkable circumftance:—A piece of brafs, which had the property of becoming magnetic by hammering, and of lofing the magnetifm by foftening, having been left in the fire till it was partially melted, I found, upon trial, that it had loft the property of becoming magnetic by hammering; but having been afterwards fairly fufed in a crucible, it thereby acquired the property it had originally, *viz.* that of becoming magnetic by hammering.

"9thly. I have likewife often obferved, that a long continuance in a fire fo ftrong as to be little fhort of melting-hot, generally diminifhes, and fometimes quite deftroys, the property of becoming magnetic in brafs. At the fame time, the texture of the metal is confiderably altered, becoming what fome workmen call *rotten*. From this it appears, that the property of becoming magnetic in brafs by hammering, is rather owing to fome particular configuration of its parts, than to the admixture of any iron; which is confirmed ftill farther by obferving, that Dutch plate brafs, which is made not by melting the copper, but by keeping it in a ftrong degree of heat whilft furrounded by lapis calaminaris, alfo poffeffes that property; at leaft, all the pieces of it, which I have tried, have that property.

"From thefe obfervations it follows, that when brafs is to be ufed for the conftruction of inftruments wherein a magnetic needle is concerned, as dipping needles, variation compaffes, &c. the brafs fhould be either left quite foft, or it fhould be chofen of fuch a fort as will not be made magnetic by hammering; which fort, however, does not occur very frequently."

For the remarks of Mr. Bennett on Cavallo's experiments, and the reply of the latter, we refer to the Phil. Tranf. for 1792, and the appendix to Cavallo's Magnetifm. This author examined other metallic fubftances, *viz.* copper, zinc, and platina. The two former manifefted no figns of being magnetic: and of various pieces of platina, fome did not acquire any magnetifm by hammering, and others were rendered evidently attractable by the magnet by three or four ftrokes, and about ten ftrokes gave them the full power of which they were fufceptible. But when the grains of platina that were made capable of being attracted by the magnet under the operation of hammering were put upon a charcoal fire, and made red-hot by means of a blowpipe, and were afterwards prefented firft to the magnet and alfo to the fufpended needle, they fhewed not the leaft fign of attraction. Heat, therefore, deprives them, as well as brafs, of the property acquired by hammering. Mr. Cavallo concludes upon the whole from experiments of this kind, that the power of being attracted by the magnet may exift, or may belong to other fubftances, independent of iron; and therefore that the attraction of a few a few particles of any unknown substance by the magnet is not a sure sign of the presence of iron. Although it be true, that iron is always attractable by the magnet, yet it does not hence follow, that whatever is attracted by the magnet must be iron.

Amber, and other combustible minerals, are generally attracted by the magnet, especially after burning. Of the precious stones, those that are pellucid, as the diamonds and crystals, are not attracted. The amethyst, topaz, chalcedony, and generally those which are deprived of their colour by fire, are not attracted. The other precious stones are all attracted, *viz.* the ruby, especially the oriental, the chrysolite, and the tourmalins. The emerald, and particularly the garnet, are not only attracted, but frequently acquire an evident polarity from the influence of a strong magnet, so that afterwards they are attracted from one side and repelled from the other. The opal is but weakly attracted. Almost every part of animal or vegetable bodies, after combustion, is in great measure attracted by the magnet. The flesh, and especially the blood, after burning, are attracted most, but the bones are attracted less powerfully. The vegetables, after burning, are almost all, though not with equal force, attracted by the magnet. But unburned and most animal or vegetable substances very seldom, if ever, shew any perceptible attraction towards the magnet. Even soot, and the dust which usually falls upon whatever is left exposed to the atmosphere, are sensibly attracted by the magnet. Hence it appears that iron, though divided into exceedingly small particles, is in some state or other mixed with every substance: that it is to be found in animals, in vegetables, in minerals, and even in the air; that in every state of existence it always shews some attraction towards the magnet; and that its existence in several substances can be discovered by no other known method besides the magnet. But we have already observed, that there is reason for presuming, that some bodies independent of iron, are attracted by the magnet.

11. A needle touched by a magnet will turn its ends the same way towards the poles of the world, as the magnet itself does. 12. Neither the load stone nor needles touched by it do conform their poles exactly to those of the world, but have usually some variation from them; and this variation is different in divers places, and at divers times in the same place. (See DECLINATION, DIPPING, and VARIATION.) 13. A load-stone will take up much more iron when armed or capped, than it can when naked. See ARMS and *Armed* MAGNET.

It has also been observed, that amongst the natural magnets, the smallest generally possess a greater attractive power, in proportion to their size, than those which are larger. There have been often seen natural magnets not exceeding the weight of 20 or 30 grains, which could lift a piece of iron that weighed 40 or 50 times more than themselves. Mention is made of a small magnet wore in a ring, which weighed about three grains, and was capable of taking up 746 grains, or nearly 250 times its own weight; and we have seen one which could not weigh more than six or seven grains, and was capable of lifting a weight of about 300 grains. But magnets of above two pounds weight seldom lift up ten times their own weight of iron.

It often happens, that a natural magnet, cut off from a larger load-stone, will itself be capable of lifting a greater weight of iron than the original large load-stone from which it was cut off. This must be imputed to the heterogeneous nature of the large load-stone; for, suppose that one part of it contains a good quantity of pure metal strongly magnetical, the rest of it being impure or mixed with other substances, it is plain that the impure part can only obstruct the action of the purer part; hence this latter, being separated from the rest, must act more powerfully than the whole together did.

14. The force of a magnet may be variously increased or lessened by the various application of iron, or another magnet, to it. Thus, the holding of a piece of iron of some magnitude to one pole of a magnet, increases the attraction of the other pole, so as to enable it to lift a greater weight. Also, the attractive power of a magnet may be increased considerably by gradually adding more and more weight to it; for by this means it will be found that the magnet will keep suspended on one day a little more weight than it did the preceding day; which additional weight being added to it on the following day, or some time after, it will be found that the magnet can keep suspended a weight still greater, and so on as far as a certain limit.

On the contrary, by an improper situation, or by putting a very small weight of iron into it, the magnet may gradually lose much of its strength.

Heat weakens the power of a magnet; and a white heat destroys it entirely, or at least in a great measure. Hence it appears, that from this cause alone, besides others which may concur, the power of a magnet must be continually varying.

15. A strong magnet at the least distance from a lesser, or a weaker, cannot draw to it a piece of iron adhering actually to such lesser or weaker stone; but if it come to touch it, it can draw it from the other: but a weaker magnet, or even a little piece of iron, can draw away or separate a piece of iron contiguous to a greater or stronger load-stone.

16. In these northern parts of the world, as various authors have said, the north pole of a magnet generally has an attractive power somewhat stronger than the south pole; but in the southern parts of the earth, the south pole of the magnet is said to possess the greatest attractive power. However, this law has not yet been properly ascertained.

17. Neither the attraction nor the repulsion of magnetism is sensibly affected by the interposition of bodies of any sort, except iron or ferruginous bodies in general. Thus, suppose that when a magnet is placed at an inch distance from a piece of iron, there is required an ounce of force to remove it; or, which is the same thing, suppose that the attraction towards each other is equal to one ounce; it will be found that the same degree of attraction remains constantly unaltered, *viz.* always equal to one ounce, though a plate of other metal, or of glass, or paper, or other body, be interposed between the magnet and the iron; or though they be inclosed in separate boxes of glass or other matter. Neither the absence or presence of air has any effect upon them. In short, no other substance besides iron, or those bodies which contain that metal in any of its metallic states, does sensibly affect the attraction or repulsion of magnetism. Accordingly, Mr. Boyle found this true in glasses sealed hermetically; and glass is a body as impervious, as most are, to any effluvia. The magnetic virtue is sensibly continued through the substance of several contiguous bodies or pieces of iron, as keys, &c. It pervades the pores of the hardest bodies; and equally attracts the iron in vacuo, as in open air.

18. It has frequently been observed, that bars, and other pieces of iron, by having remained a long time in one situation, have become magnetic. Sometimes iron bars, which were not capable of a permanent magnetism on account of their softness, have in time, and by being left exposed to the atmosphere in a due situation, acquired a considerable degree of magnetism; but it has been also remarked,

marked, that thofe bars have, at the fame time, become harder; which is, perhaps, owing to a partial calcination, or to fome other hitherto unafcertained change in the nature of the iron.

The polarity thus communicated by the earth to iron bars, is more or lefs permanent, in proportion to the degree of hardnefs of the iron, the time of their remaining in one fituation (the moft proper being that of the dipping-needle), and laftly, the fhape of the iron, or the proportion between the thicknefs and length of the pieces.

An oblong piece of iron made red-hot, and then left to cool in the magnetical line, acquires thereby a degree of magnetifm, which is more or lefs permanent, according to the nature of the iron. The reafon of which is, becaufe, whilft red-hot, the iron is foft, and therefore the earth can render it magnetic more eafily; but, when cooled, it becomes harder, and confequently more tenacious of the acquired power.

In drilling, filing, hammering, and, in fhort, in all thofe cafes in which iron, fteel, &c. is put into violent action, fome of the pieces concerned frequently acquire a confiderable degree of magnetifm; the origin of which muft be derived from the earth, and from the changeable nature of the metal, or the viciffitudes of heat, cold, and vibratory motion, in which it is accidentally put.

Profeffor Robifon found, that when a good magnet was ftruck for ¾ths of an hour, and allowed in the mean time to ring, its efficacy was deftroyed; although the fame operation had little effect when the ringing was impeded; fo that the continued exertion of the cohefive and repulfive powers appears to favour the tranfmiffion of the magnetic as well as the electric fluid.

It feems that, for the fame reafons, magnetifm is in certain cafes produced by means of electricity; the particulars obferved concerning which are the following, and they were afcertained by means of the moft powerful electrical machine that has been yet made. They in a great meafure coincide with thofe made with other machines.

When the bar or needle is laid horizontally in the magnetic meridian, whichever way the fhock of an electric jar or battery enters, the end of the bar that ftands towards the north will acquire the north polarity, *viz.* the power of turning towards the north when freely fufpended; the other end acquiring the fouth polarity. If the bar, before it receives the fhock, has fome polarity, and is placed with its poles contrary to the ufual direction, then its original polarity is always diminifhed, and often reverfed.

When the bar or needle is ftruck ftanding perpendicularly in thefe parts of the world, its loweft end becomes the north pole, even when the bar had fome magnetifm before, and receives the fhock whilft ftanding with its fouth pole downwards. When all the other circumftances are alike, the bars feem to acquire an equal degree of magnetic power, whether they are ftruck whilft ftanding horizontally in the magnetic meridian, or perpendicular to the horizon.

When a bar or needle is placed in the magnetic equator, the fhock fent through its length very feldom, if ever, renders it magnetic; but if the fhock be paffed through its width, then the needle becomes magnetic, the extremity of it which was laid towards the weft, generally becoming the north pole.

If a needle or bar ftrongly magnetic, or a natural magnet, be ftruck by the electric fhock, its power is thereby diminifhed.

When the fhock is too ftrong, with refpect to the fize of the fteel needle, fo as to render it confiderably hot, then it acquires either none at all, or a very fmall degree of magnetifm.

For thefe experiments, the bars or needles muft be proportioned to the degree of electric power; otherwife they will not fucceed. See Van Marum's account of a very powerful electrical machine, conftructed for the Mufeum of Teyler at Haerlem; and Cavallo's Treatife on Electricity, vol. i. p. 66, and vol. ii. p. 282.

Hence, a ftroke of lightning, which is an electrical phenomenon, often renders magnetic pieces of iron, or fteel, or thofe bodies which contain iron, as certain bricks, &c.

If one pole of a magnet, for inftance the north, be applied to one end, C, of an oblong piece of iron or fteel, like C D, (*fig.* 4.) that end, C, will become a fouth pole; and if the bar, C D, be very long, there will be found a part of it, not far diftant from C, which is poffeffed of the north polarity; and this is followed by another part poffeffed of the fouth polarity; and fo on alternately, till the power becomes imperceptible; the number of thofe fucceffive poles depending upon the ftrength, and principally upon the length of the bar; but if the bar be of a proper length and thicknefs, which muft be likewife proportioned to the ftrength of the magnet employed, then the bar will have only two poles, its other extremity, D, acquiring the north polarity.

In the latter cafe, if the pole of the magnet be gradually moved along the furface of the bar from C as far as D, it will afterwards be found, that the polarity of the bar is entirely changed, the extremity, C, being now poffeffed of the north, and the extremity, D, of the fouth polarity.

It is evident, that, whilft the magnet is advancing along the furface of the bar, the fouth polarity of the end C, before it changes into a north polarity, muft decreafe in ftrength; and that when the magnet is at a certain point M, the end, C, has no polarity at all; its fouth polarity being juft vanifhed, and the north polarity juft beginning. With refpect to the extremity D, it muft be obferved, that its north polarity, by the approach of the magnet, is increafed as far as a certain limit H; after which, as the magnet comes ftill nearer to D, the north polarity of this extremity decreafes, till it vanifhes when the magnet is arrived at a certain point N; after which its north polarity begins to be changed into a fouth one.

The points, M and N, have been called the *points of indifference*; becaufe, when the magnet is at M, the extremity, C, of the bar has neither the fouth nor the north polarity; and when the magnet is at N, the end, D, has no polarity. The point, H, has been called the *culminating point*, becaufe, when the magnet is at that point, the polarity firft acquired by the end, D, of the bar is the ftrongeft.

As the determination of thefe points, in bars of different forts of iron, of different lengths, &c. not only fhews more evidently the action of the magnet, and points out the advantages and difadvantages attending the practical methods of making artificial magnets, but is befides likely to open the way to farther difcoveries; there have been no pains fpared to inveftigate the particulars on which their fituation depends, and a vaft number of accurate experiments have been made for that purpofe; but, notwithftanding thofe endeavours, fuch is the various nature of magnets, of iron, &c. that the prefent knowledge of the fubject does not allow thefe points to be determined in a given bar, without actual experiments. The general laws which may be deduced from the various experiments made for this purpofe, are the following:

1. The points M, H, and N, do not come always in the order fhewn by the figure; but though their order is not always the fame, yet it is evident that the point, H, can never

never coincide with, or come after N, *viz.* nearer to the end D, than the point N.

2. When the bars differ in length only, every thing elſe being the ſame, the longer the bar is, (as far as a certain limit, which depends on the ſtrength of the magnet employed,) the greater is the diſtance C M.

3. The ſtronger the magnet is which is employed, the greater is the diſtance C M, as far as a certain limit, which depends upon the proportion between the power of the magnet and the length of the bar; and beyond which limit C M will be ſhorter than if a weaker magnet had been uſed.

4. When the bars differ in length only, every thing elſe being the ſame, the diſtance, C H, is greater in a longer than in a ſhorter bar, as far as a certain limit, which depends as has been mentioned above.

5. The ſtronger the magnet is which is uſed, the greater is the diſtance C H, as far as a certain limit, which depends as above.

6. In a longer bar, every thing elſe being the ſame, the diſtance, C N, is greater than in a ſhorter one, as far as a certain limit, &c.

7. The diſtance C N, in bars of equal length, is greater when a ſtronger than when a weaker magnet is uſed, as far as a certain limit, &c.

8. When the bars differ only in thickneſs, every thing elſe being the ſame, the diſtance, C M, is greater in thicker than in thinner bars; but the diſtance, C N, is nearly the ſame in them all, as far as a limit, which depends as before-mentioned.

9. Laſtly, when the bars differ only in hardneſs, the diſtances C M, C H, C N, are ſometimes equal, ſometimes greater, and ſometimes ſhorter, in the harder than in the ſofter bars.

Beſides the points of indifference and culmination, there is another point to be conſidered, namely, the magnetic centre, which is the point or part between the two poles, where the magnet has no attraction nor repulſion. With reſpect to this point, we ſhall briefly obſerve, that it does not always lie midway between the two poles; and that, when one pole of a magnet is drawn over the ſurface of an oblong piece of iron, as in the before-mentioned experiment, the magnetic centre moves forwards in proportion as the magnet is advanced; but at a certain limit, both the magnet and the ſaid centre are in the ſame place, or rather in oppoſite ſides of the thickneſs of the bar. The motion and place of the magnetic centre are ſubject to a great deal of variety, ariſing from the nature, length, and thickneſs of the bar, as well as from the ſtrength of the magnet, and from the manner of drawing it along the ſurface of the iron or other ferruginous body.

When any magnet, but eſpecially an oblong one, having two poles, is broke in two, the magnetic centre of each part is at firſt generally much nearer that end of the piece which is contiguous to the fracture; but in time it advances nearer the centre of the piece.

What has been obſerved concerning oblong pieces of iron or ſteel, may ſerve to explain the phenomena which take place in pieces of an irregular form; the particular enumeration of all which caſes would be endleſs, and of little, if at all of any uſe.

Every piece of iron or ferruginous body is capable of retaining only a certain degree of magnetic power; ſo that if a ſtrong magnet be applied to a comparatively ſmall piece of ſteel, that piece, whilſt it remains within the influence of the magnet, will appear to be very powerfully magnetic; but, as ſoon as it is removed from the vicinity of the magnet, its power begins to decreaſe, and in a ſhort time comes down to that degree which the piece of ſteel is capable of, and which may be called *its point of ſaturation*. Hence it follows, that if a certain magnet is juſt ſufficient to communicate to a piece of iron or ſteel the full power of magnetiſm of which that piece is capable, a ſtronger magnet will not increaſe it in the leaſt.

19. The power or virtue of a magnet, and of iron or ſteel impregnated with the magnetic virtue, may be impaired by long lying in a wrong poſition, with regard to the earth or with reſpect to each other. Thus, if two magnets be placed ſo, that their contrary poles may be contiguous to each other, they will preſerve one another's power; but if the north pole of one be placed near the north pole of the other, and the ſouth near the ſouth, then they will entirely deſtroy or diminiſh each other's magnetiſm; and if their original powers were very unequal, the polarity of the weaker magnet will be changed by the action of the ſtronger one.

In general, the ſame means which facilitate the communication of magnetiſm, when pieces of iron, &c. are properly ſituated with reſpect to the poles of the earth, or of other magnets, will likewiſe facilitate the loſs of magnetiſm, when the magnets are improperly ſituated; thus, a red heat deſtroys in a great meaſure, or entirely, the power of a magnet. A ſteel bar, ſtrongly magnetic, will have its power much diminiſhed by being repeatedly ſtruck between two ſtones, eſpecially if it be ſtruck ſtanding in a direction perpendicular to the magnetic meridian. A bar of pretty hard iron, which has acquired ſome degree of permanent magnetiſm, by being made red-hot, and then cooled in the direction of the magnetical line, will have that power deſtroyed, or much diminiſhed, by a few ſmart blows on its middle.

20. Some have ſaid that iron or ſteel has been rendered heavier or lighter by being magnetic; but Gaſſendus, Merſennus, and Gilbert maintain the contrary; and it ſeems to be allowed, upon the whole, that its weight is not thus affected. Mr. Whiſton ſays that he found, by accurate experiments with large needles, that after the touch they weighed leſs than before. One of $4584\frac{1}{2}$ grains loſt $2\frac{5}{8}$ grains by the touch; and another of 65,726 grains loſt no leſs than 14 grains. Cavallo ſuggeſts, that the vicinity of iron, or of ſome other ferruginous body, might have had ſome action on the magnetic ſteel when it was weighed.

21. A piece of iron wire, well touched, will, upon being bent round in a ring, or coiled round on a ſtick, &c. generally quite loſe its directive virtue; but it will always have it much diminiſhed: and yet if the whole length of the wire was not entirely bent, ſo that the ends of it, though but for the length of one-tenth of an inch, were left ſtraight, the virtue will not be deſtroyed in thoſe parts: though it will in all the reſt. This was firſt obſerved by Meſſrs. Grimaldi and De la Hire; and is confirmed by the experiments of Dr. Derham; who adds farther, that though coiling or bending the wire as above would always deſtroy its virtue by day, yet it would not do it in the evening. In order to weaken or deſtroy the magnetiſm of a wire by bending, let the magnetic power be communicated to an iron or ſoft ſteel wire, of about four or five inches in length, and about $\frac{1}{50}$th of an inch in diameter; then roll it round a ſmall ſtick, ſo as to make four or five revolutions round the ſtick; after which, on ſtraightening the wire again, its magnetiſm will be generally found to be quite deſtroyed by the bending, or conſiderably weakened.

The effect is the ſame with ſhorter or longer wires; for, if they make one revolution round the ſtick, the effect will take place; which is evidently owing to the ſtreſs or derangement of the particles of the wire, as is rendered more evident by the following obſervation; *viz.* that if the wire be of ſuch ſpringy nature, as to recover its ſtraight ſituation, if left to itſelf, after coiling it round the ſtick, then its magnetiſm is either not at all, or little diminiſhed: ſo that, in order to produce the above-mentioned effect, a ſtraining of the parts of the wire is abſolutely neceſſary.

When only the middle of the wire is bent, and its extremities remain ſtraight, then the magnetiſm is ſeldom deſtroyed, or even diminiſhed.

If a piece of magnetic wire be cleft or ſplit lengthwiſe, the parts will have ſometimes contrary, and ſometimes the ſame poles as they had when in one piece. When one part is much thinner than the other, then this ſlender part will generally have its poles reverſed.

22. The ſphere of the activity of magnets is greater and leſs at different times: in particular that preſerved in the repoſitory of the Royal Society will keep a key or other body ſuſpended to another, ſometimes at the height of eight or ten feet; and at others, not above four feet. (See 4 above.) To which we may add, that the variation of the magnetical needle from the meridian varies at various times of the day; as appears from ſome experiments of Mr. Graham. See Declination and Variation.

23. The directive power of a magnet is extended to a greater diſtance than its attractive power; for inſtance, if a magnet be freely ſuſpended, another magnet properly ſituated within a certain diſtance of the former, will turn it out of its wonted direction; yet the degree of attraction exerted by theſe magnets againſt each other, is not ſenſible at that diſtance; which may be eaſily tried, by fixing one of the magnets to the ſcale of a balance. The reaſon of this property is, that the directive power depends both upon the attraction of the poles of different names, and on the repulſion of thoſe of the ſame name; whereas, the attraction takes place only between poles of different names. In order to render this explanation more intelligible, imagine that a magnetic needle is freely ſuſpended, and is placed within the influence, or ſphere of action of a magnet. In this diſpoſition, ſuppoſe that the north pole of a magnet attracts the ſouth pole of a magnetic needle with a force equal to ten grains; and, as the attraction between poles of different names is nearly equal to the repulſion between poles of the ſame name, it follows, that the ſame north pole of the magnet repels the north pole of the magnetic needle with a force equal to ten grains: but theſe two forces both concur in altering the direction of the needle; therefore, the endeavour of the magnet to turn the needle's direction is equal to 20 grains; whereas the attraction, or the force by which the needle is drawn towards the magnet, is only equal to the difference between the two above-mentioned oppoſite forces, which difference ariſes from the pole of the magnet being nearer to one than to the other of the poles of the needle. The ſame reaſoning may be applied to the action between the ſouth pole of the magnet and the ſuſpended needle.

24. By twiſting a piece of wire touched with a magnet, its virtue is exceedingly diminiſhed, and ſometimes ſo diſordered and confuſed, that in ſome parts it will attract, and in others repel; and even in ſome places, one ſide of the wire ſeems to be attracted, and the other ſide repelled by one and the ſame pole of the ſtone. The effect of magnets on a crooked wire may be ſhewn in the following manner. Let an iron wire of about a quarter of an inch in diameter, and four or five inches long, be bent ſomewhat like a Gothic arch, *viz.* with a ſharp corner in the middle, A B C, *fig.* 5, and tie it faſt to a croſs bar, or let an aſſiſtant hold it with the corner downwards; then apply either pole of the magnet, D E, to one of its extremities A, and whilſt the magnet remains in that ſituation, apply a piece of iron, H, of no great ſize, to the corner C, and you will find that the iron remains ſuſpended. Now, if another magnet be applied to the other extremity, B, of the crooked wire, ſo that the pole, G, may be contrary to the pole E, the iron, H, will immediately fall off; but if the pole, G, be analogous to the pole E, *viz.* be both ſouth, or both north, then the iron, H, not only will remain adhering to C, but the ſaid corner will be capable of ſupporting a weight ſtill greater than H. The reaſon of which is, that in the former caſe, the extremities, A, B, of the bent wire being poſſeſſed of different polarities, the corner, C, was the magnetic centre, where there is no attraction nor repulſion; whereas, in the ſecond caſe, both extremities of the bent wire being poſſeſſed of the ſame polarity, the corner, C, was neceſſitated to acquire the contrary polarity; and in this caſe, the bent wire muſt have two magnetic centres, *viz.* one on each ſide. 25. A piece of wire that has been touched, being ſplit or cleft lengthwiſe, in two, the poles are ſometimes changed; as in a cleft magnet; the north becoming the ſouth, and the ſouth the north: and yet ſometimes one-half of the wire will retain its former poles, and the other half will have them changed. When one part is much thinner than the other, then the ſlender part will generally have its poles reverſed. (See No. 21 *ſupra.*) To which it may be added, that laying one or other ſide of the half uppermoſt, cauſes a great alteration in its tendency or averſion to the poles of the magnet. 26. A wire being touched from end to end with the ſame pole of the magnet, the end at which you begin will always turn contrary to the pole which touched it: if it be again touched the ſame way with the other pole of the magnet, it will then be turned the contrary way. 27. If a piece of wire be touched in the middle with only one pole of the magnet, without moving it backwards or forwards; in that place will be the pole of the wire, and the two ends will be the other pole. 28. If a magnet be heated red-hot, and again cooled either with its ſouth pole towards the north in a horizontal poſition, or with its ſouth pole downwards, in a perpendicular poſition, its poles will be changed. 29. Mr. Boyle (to whom we are indebted for the following magnetical phenomena) found he could preſently change the poles of a ſmall fragment of a load-ſtone, by applying them to the oppoſite vigorous ones of a large magnet. Dr. Knight diſcovered a method of changing the direction of the poles in natural magnets, multiplying and variouſly placing them at pleaſure. In the firſt inſtance, recorded in the Philoſophical Tranſactions, he inverted the poles of a magnet by a proceſs which required only a minute's time; ſo that the ſame end, which before attracted the ſouth end of the needle, now attracted the north and repelled the ſouth, and *vice verſâ:* in the ſame time he again turned the direction of the polarity of the ſtone at right angles, to its former direction; and afterwards inverted this laſt direction of the poles. In the ſecond ſeries of experiments, he cut a piece of natural load-ſtone into the ſhape of a parallelopiped $\frac{8}{10}$ths of an inch long, $\frac{4}{10}$ths of an inch broad, and $\frac{2}{10}$ths of an inch in thickneſs: its weight was three drams and ten grains. In this ſtone he placed the magnetical virtue in ſuch a manner, that the two oppoſite ends became, both of them, ſouth poles, and the middle was quite round a north pole. The two oppoſite ends of another ſtone were made both north poles, and the two oppoſite ſides ſouth poles. At one end of another ſtone he placed a north pole, ſurrounded by a ſouth; and at the other end a ſouth, ſurrounded by a north pole; ſo that the edges of

each ſurface had a pole of a different denomination from that which occupied the middle. On another occaſion, he inverted the poles at the ends of a piece of magnet, and then transferred them to the ſides of the ſtone. All theſe changes of the poles are eaſily produced by ſteel bars, A B, C D, (*Plate* VI. *Magnetiſm, fig.* 6.) impregnated with a ſtrong magnetic virtue, by which the piece of magnet, E F, placed between them is ſo affected, that the poles may be changed at pleaſure, and excited in places that are touched by the ends of the bars. Mr. Michell has ſhewn the method of doing this both in ſmall and large magnets. If a ſmall and ſhort magnet is to have its poles changed, lay the ſupporters deſcribed under *Armed* MAGNETS ſo, that the centre of their force ſhall, at each end, lie at the end of the line deſigned to be the axis of the magnet, and touch it double in the manner explained under *Artificial* MAGNET, as near as may be in that direction. If the poles are to be converted, and the magnet be long enough, touch it double, according to the directions for converting the poles of an artificial magnet; then ſupport it, and touch it over again with freſh touches: or if the magnet is ſhort, apply bars as ſupporters only, and change them two or three times: or elſe make uſe of the following method, applicable to large magnets. If the poles of ſuch are to be changed, the middle of the end of the piece of iron placed at each end of the magnet (ſee *Armed* MAGNET) is to be placed againſt the end of the line deſigned to be the axis. If the poles are to be converted, it ſhould be done firſt by touching double, if a ſufficient force of magnetical bars can be applied for this purpoſe: but if, by touching double, the poles will not be converted, place the magnet between two pieces of iron, then keeping them ſteady at their diſtance, remove the magnet, and connecting the pieces of iron by wedges of iron, that may not ſtand in the way of it, when it is to be put in its place again, apply the ſupporters as before, and putting the magnet in its place, take off the iron wedges. This may be done two or three times, if it be found neceſſary, re-touching the ſupporters every time. (See *Artificial* MAGNET.) It is well known, that lightning not only deſtroys, but reverſes, in ſome caſes, the poles of magnetic needles. 30. Hard iron tools, well tempered, when heated by a briſk attrition, as filing, turning, &c. will, while warm, attract thin filings, or chips of iron, ſteel, &c. though not when cold; though there are not wanting ſome inſtances of their retaining the virtue when quite cold. 31. The iron bars of windows, &c. which have ſtood a long time in an erect poſition, grow permanently magnetical; the lower end of ſuch bars being the north pole, and the upper end the ſouthern. 32. A ſtraight bar of ſoft iron (*e. g.* one of two or three feet in length, and about ½ths of an inch in diameter), that has not ſtood long in an erect poſture, if it be only held, in theſe parts of the world, in a vertical poſition, will become magnetical; and its lower end the north pole; as appears from its attracting the ſouth pole of a needle; and the upper end the ſouth pole, being capable of repelling the ſouth pole: but then this virtue is tranſient, and by inverting the bar, the poles will ſhift their places. An iron bar of four or five feet in length, and above an inch thick, in this ſituation, will be capable of attracting a ſmall bit of iron, or a common ſewing-needle. The explanation of this curious phenomenon is as follows: ſince, in theſe northern parts, the earth is poſſeſſed of a ſouth magnetic polarity, the loweſt part of the iron bar, by being neareſt to it, muſt acquire the contrary, *viz.* the north polarity; the other extremity of the bar becoming a ſouth pole. It follows, likewiſe, (and it is confirmed by actual experiment), that in the ſouthern parts of the earth, the loweſt part of the bar acquires the ſouth polarity; that on the equator the bar muſt be kept horizontal, in order to let it acquire any magnetiſm from the earth; and that, even in theſe parts of the earth, the moſt advantageous ſituation of the bar is not the perpendicular, but that a little inclined to the horizon. In ſhort, in every part of the world, it muſt be placed in the magnetical line, *viz.* in the direction of the dipping-needle. If the iron bar, inſtead of being kept in the magnetical line, be placed in a direction perpendicular to it, then it will acquire no magnetiſm, becauſe, in that ſituation, the actions of both poles of the earth upon each extremity of the bar are equal. If, inſtead of the abovementioned two directions, the bar be placed in any other poſition, then it will acquire more or leſs magnetic power, according as it approaches nearer to the former or to the latter of the ſaid two directions.

A bar of hard ſteel, or of hard iron, does not acquire any magnetiſm from the earth, like the bar of ſoft iron, becauſe the magnetic power of the earth is weak, in proportion to that which is required, in order to render a ſteel bar magnetic. In order, therefore, to render the quality permanent in an iron bar, it muſt continue a long time in a proper poſition. But the fire will produce the effect in a ſhort time: for as it will immediately deprive a load-ſtone of its attracting virtue, ſo it ſoon gives a verticity to a bar of iron, if, being heated red-hot, it be cooled in an erect poſture, or directly north and ſouth. Nay, tongs and pokers, by being often heated and ſet to cool again in a poſture nearly erect, have frequently gained this magnetical property. It is a well-known propoſition, that ſoft iron, or ſoft ſteel, acquires magnetiſm very eaſily, and loſes it with equal facility; but that hard ſteel acquires that power with difficulty, and afterwards retains it obſtinately. From the conſideration of theſe properties, Mr. Cavallo was led to imagine, that if a piece of ſteel, whilſt red-hot, were placed between magnetic bars, and whilſt ſtanding in that ſituation, cold water were to be ſuddenly poured upon it, ſo as to harden it, there might, perhaps, be obtained an artificial magnet much more powerful than what can be produced in the ordinary way; becauſe the magnetic bars employed for ſuch purpoſe would communicate a great degree of magnetic power to the ſteel when red-hot, and conſequently ſoft, which power would be fixed upon the ſteel by the hardening.

In order to put this project to the trial, ſix magnetic bars were ſo diſpoſed, in an oblong earthen veſſel, as that the north poles of three of them might be oppoſite the ſouth poles of the three others, forming two parcels of bars, lying in the ſame direction, and about three inches aſunder, which was nearly the length of the ſteel bar which was intended to be rendered magnetic. Things being thus diſpoſed, the ſteel bar was made quite red-hot, and in that ſtate was placed between the magnetic bars; after which, cold water was immediately poured upon it, which rendered it ſo hard as not to admit being filed: its magnetiſm was found to be conſiderably ſtrong, but by no means extraordinary. From repeated trials with ſteel bars of different ſizes, and by uſing a greater or leſs number of magnetic bars, Mr. Cavallo found that ſhort ſteel bars acquire a proportionally greater degree of magnetiſm, by this method, than thoſe which were longer; that the magnetiſm in the longer bars is not proportionally as ſtrong, principally becauſe the artificial magnets, being placed at their extremities, have very little power on thoſe parts of the pieces of ſteel which are near its centre; and, laſtly, that when, in order to remedy the juſt-mentioned inconvenience, more magnets are placed nearer the middle of the ſteel bar, then this piece of ſteel generally acquires many ſucceſſive magnetic poles.

Upon the whole, it ſeems that though this method alone be be not sufficient to communicate to steel bars an extraordinary degree of magnetism, yet it may be of great use in constructing large artificial magnets; for, if these bars, instead of being hardened in the usual way, by plunging them, when red-hot, in water, be hardened whilst standing between powerful magnets, they will thereby acquire a considerable degree of magnetic power, without any additional trouble to the workman. They may then be polished, after which they may be rendered more strongly magnetic by the usual method of touching them with other magnetic bars; whereas it is a very laborious operation to render magnetic large bars of hardened steel from the very beginning, *viz.* when they have none of that power.

In the course of performing these trials, Mr. Cavallo frequently observed that the pieces of steel, whilst they were red-hot, seemed not to be attracted by the magnets; so that the least shock, and even the pouring of the water, could remove them from the proper situation, which rather surprised him; because it has been asserted by some authors, that the magnet attracts red-hot iron as well as cold. Kircher especially says, that he tried the experiment, (De Magnete, lib. i. p. 2, theorem xxxi.) and found that the piece of iron, heated so as to be hardly discernible from a burning coal, was attracted by the magnet as easily as when cold; and he even assigns a reason why the power of a magnet is destroyed by a great degree of heat; whereas the red heating of the iron will not prevent its being attracted by the magnet. The reason he gives is, that the fire corrupts and calcines the magnet, but purifies the iron. The following experiments were made in order to ascertain this matter:

"I kept (says Mr. Cavallo) a piece of steel in the fire till it was quite red-hot, and in that state presented the magnet to it, so as to touch it repeatedly in various places; but no sign of attraction could be perceived before the redness disappeared. I mean, however, such redness as may be evidently seen in the clear day light; for, as was shewn by other experiments, when the magnet begins to attract the heated iron, the redness of the latter can still be seen in the dark.

"Having repeated the experiment with different pieces of iron and of steel, the result was constantly the same, *viz.* whilst the iron or steel remained quite red-hot, or white-hot, the magnet did not attract it; but the attraction began when the degree of redness which is clearly perceivable in the day-light began to disappear; and it was as strong as ever when the iron was cooled a little more than when the redness quite disappeared in the dark. In regard to this limit, or maximum of attraction, I think I have observed, as well as the nature of the experiment would permit, a difference between steel and iron; which is, that in the steel the maximum of attraction follows the disappearance of the red heat sooner than in iron.

"This experiment is subject to two sources of mistake, which, perhaps, misled father Kircher, and which it is necessary to mention, for the sake of others who wish to repeat it. The first is, that when a piece of iron, of no great extent, is red-hot, or even white-hot, in one place, and below a red heat in other parts, the magnet will frequently attract it, though the red-hot side be presented to it. The second cause of mistake is, that when a small piece of iron or steel, as a common sewing-needle, is made red-hot, and is then presented to the magnet, if the magnet touch it, the contact cools it instantly below the necessary degree of heat, and of course the attraction takes place. It is owing to this last cause, that I have not yet been able to ascertain, whether the attraction between the magnet and the iron be quite annihilated, or only diminished to a great degree, by rendering the iron red, or white-hot; so that I can only say with certainty, that a magnet will not attract a certain piece of iron red-hot, or white-hot; whereas it will attract another piece of iron, at least fifty times bigger, if it be cold, or below a red heat.

"To try this experiment in a different and more convincing manner, I heated a large iron nail till it was white-hot, and in that state placed it upon an earthen support, near one pole of the magnetic needle, so as to lie, not in the same direction, but on one side of it. Then, looking attentively on the graduated circle of the compass, I observed, that the needle was not in the least moved from its natural situation, whilst the nail remained red-hot; but, as soon as the redness began to disappear, the needle advanced towards the nail, and a few seconds after the needle pointed directly towards it.

"I tried whether, in this experiment, any difference was occasioned by the magnet's being natural or artificial; but, as it might be expected, there was none.

"In pursuance of those magnetic experiments wherein heat is concerned, I tried the effects which took place when the magnet was heated; but, as the diminution of its power by heating, and an increase of it by cooling, were observed and described by the late Mr. Canton, (Phil. Transf. vol. li.) I shall only add a circumstance, which may perhaps be new. It is, that an artificial magnet, after having had its power diminished by heating, does not recover it entirely again by cooling; having constantly found, that the magnets which had been heated, after cooling would never hold so great a weight of iron as they did before. The heat to which those magnets were exposed never exceeded that of boiling water. This was rendered more evident by the following experiment.

"A magnetic bar was placed in an earthen vessel, at some distance from the south pole of the needle of a very good compass; by the action of which magnet, that end of the needle was drawn several degrees from the magnetic meridian, or from the direction in which it stood before. In this situation of the apparatus, boiling water was poured into the vessel wherein the magnet stood, in consequence of which the needle went back two degrees and a half. Some time after, when the water was quite cold, the needle was found nearer to the magnet, but not so near as it stood before the hot water was poured into the vessel."

33. Mr. Boyle found, that by heating a piece of English ochre red-hot, and placing it to cool in a proper posture, it manifestly acquired a magnetic virtue. And an excellent magnet of the same ingenious gentleman's having lain near a year in an inconvenient posture, had its virtue surprisingly impaired; as if it had been injured by fire. 34. A needle well touched, it is well known, will point north and south: if it have one contrary touch of the same stone, it will be deprived of its faculty; and by another such touch, it will have its poles quite changed. 35. If a bar of iron have gained a verticity by being heated red-hot, and cooled again, north and south, and then hammered at the two ends; its virtues will be destroyed by two or three smart blows on the middle. Mr. Martin says, that by a smart stroke of a hammer on the untouched end of the dipping-needle, he has often caused the whole magnetic virtue to come to that end from the other, so as to make it dip on that side as much as it did on the other before: on the contrary, by such a stroke he has sometimes made it dip much more on the touched end than before. Sometimes, by striking it, the needle, which dipped before, will be restored to its equilibrium, as if the virtue had

had made its eſcape, or were uniformly diffuſed all over the needle. 36. By drawing the back of a knife, or long piece of ſteel wire, &c. leiſurely over the pole of a load-ſtone, carrying the motion from the middle of the ſtone to the pole; the knife or wire will accordingly attract one end of the needle: but if the knife or wire be paſſed from the ſaid pole to the middle of the ſtone, it will repel that end of the needle which in the other caſe it attracts. 37. Either a magnet or a piece of iron being laid on a piece of cork, ſo as to ſwim freely in water; it will be found, that whichſoever of the two is held in the hand, the other will be drawn to it: ſo that iron attracts the magnet as much as it is attracted by it; action and re-action being always equal. In this experiment, if the magnet be ſet afloat, it will direct its two poles to the poles of the world. 38. A knife, &c. touched with a magnet, acquires a greater or leſs degree of virtue, according to the part it is touched on. It receives the ſtrongeſt touch, when it is drawn leiſurely from the handle towards the point over one of the poles: and if the ſame knife thus touched, and thus in poſſeſſion of a ſtrong attractive power, be retouched in a contrary direction, *viz.* by drawing it from the point towards the handle over the ſame pole, it immediately loſes all its virtue. 39. The attraction of iron towards the magnetic needle, or magnet, is increaſed to a certain degree by the action of vitriolic acid. The experiment, aſcertaining this fact, is ſtated by Mr. Cavallo, who made the diſcovery of it, as follows: ſome pieces of iron, as filings, nails, &c. are put into an earthen pot, and the pot is placed laterally near one end of a ſenſible magnetic needle; in conſequence of which, that end of the needle will be drawn away from its natural direction, and will approach the pot more or leſs, according to the quantity of iron and vicinity of the pot. In this ſituation, if diluted vitriolic acid be poured upon the iron in the pot, ſo as to occaſion a briſk effervеſcence, the needle will be found to come nearer to the pot during ſome minutes, after which it will gradually recede. This increaſed attraction is more or leſs, according to the quantity, ſurface, and vicinity of the iron, according to the briſkneſs of the effervеſcence, &c. but with two or three ounces of iron filings, or with about ſix ounces of nails, and a ſuitable quantity of diluted vitriolic acid, the needle may be expected to make a movement from about 15′ to half a degree.

"When I firſt obſerved this phenomenon, I naturally ſuſpected (ſays Mr. Cavallo) that the increaſed attraction might have been cauſed by a quantity of iron filings being brought by the violence of the effervеſcence nearer to that ſide of the pot which ſtood towards the needle; and to avoid this ſource of miſtake, I tried the experiment with a ſingle piece of wire inſtead of filings, and twiſted the wire in various directions, ſo as to be admitted into the pot. This experiment was ſeveral times repeated then, and alſo very lately, and the iron was uſed in various forms, *viz.* nails, turnings, pieces of wire, &c. but the reſult has been invariably the ſame, namely, an increaſed attraction." Mr. Bennett has queſtioned the fact. See Phil. Tranſ. for 1792, p. 93.

40. Natural magnets may be imitated in the following manner: Take ſome martial æthiops, or, which is more eaſily procured, reduce into very fine powder the ſcales of iron, which fall from red-hot iron when hammered, and which are found abundantly in ſmith's ſhops. Mix this powder with drying linſeed oil, ſo as to form it into a very ſtiff paſte, and ſhape it in a mould ſo as to give it any form you require, whether of a terrella, a human head, or any other. This done, place it in a warm place for ſome weeks, and it will dry ſo as to become very hard. Then render it magnetic, by the proper application of powerful magnets, and it will acquire a conſiderable power.

We ſhall here ſubjoin ſome additional obſervations on the ſubject, extracted from the laws of magnetiſm, propoſed by Mr. Whiſton. An inclinatory, or dipping-needle, of ſix inches radius, and of a priſmatic, or cylindric figure, when it oſcillates along the magnetic meridian, performs, according to Mr. W. every mean vibration in about 6′ or 360‴; and every ſmall oſcillation in about 5½″, or 330″; and the ſame kind of needle, four feet long, makes every mean oſcillation in about 24″, and every ſmall one in about 22″.

The entire power of magnetiſm in this country, as it affects needles a foot long, is, as he ſays, to that of gravity nearly as 1 to 300; and as it affects needles four feet long, as 1 to 600. And the quantity of magnetic power accelerating the ſame dipping needle, as it oſcillates in different vertical planes, is ever as the coſines of the angles made by thoſe planes, and the magnetic meridian, taken on the horizon.

Thus, if we would eſtimate the quantity of forces in the horizontal and vertical ſituations of needles in London, we ſhall find that the latter, in needles a foot long, is to the entire force along the magnetic meridian, as 96 to 100; and in needles four feet long, as 9667 to 10000: whereas in the former, the entire force in needles a foot long is as 28 to 100; and in thoſe four feet long, as 2569 to 10000. Whence it follows, that the power by which horizontal needles are governed in theſe parts of the world, is but one quarter of the power by which the dipping needle is moved.

Hence, alſo, ſince the horizontal needle is moved only by a part of the power which moves the dipping-needle; and that it only points to a certain place in the horizon, becauſe that place is the neareſt its original tendency of any its ſituation will allow it to tend to; whenever the dipping-needle ſtands exactly perpendicular to the horizon, the horizontal needle will not reſpect one point of the compaſs more than another, but will wheel about every way uncertainly.

The time of oſcillation and vibration, both in dipping and horizontal needles equally good, is as their length directly; and the actual velocity of their points along their arcs is always equal.

Hence magnetic needles are, *cæteris paribus*, ſtill better, the longer they are; and that in the ſame proportion with their length.

Magnet, in *Medicine.* Some writers of the middle ages have, from a miſtaken tranſlation of Theophraſtus, been induced to account the load-ſtone poiſonous, which the ancients were ſo far from doing, that they gave it inwardly. Galen aſcribes a purgative quality to it, and recommends it in dropſies; and Dioſcorides preſcribes it as a good medicine to evacuate groſs melancholic humours. It is doubtleſs poſſeſſed of the ſame virtues with the other ores of iron, though in modern times never uſed inwardly, having been only made an ingredient in ſome plaſters. To theſe plaſters very extraordinary virtues have been aſcribed; ſuch as that, when applied to wounds, they would extract iron, or even a knife, from the human body. See ſeveral ſimilar ſtories in Kircher's "De Magnete," who was too wiſe to give them any credit. The chemiſts are ſaid to have been able to extract an oil of wonderful efficacy from the magnet, and to have made with it ſeveral preparations.

It has been ſaid, that the application of the artificial magnet, or of a magnetical bar, to the teeth, will effectually cure the tooth-ache, that it will eaſe the pains of parturient women, that it will diſperſe white ſwellings, &c.; and, on on the contrary, that the wounds made with a knife, or other steel instrument, which has been previously rubbed with a magnet, are mortal. It is hardly necessary to add, that none of these pretended medicinal or poisonous qualities in the magnet are warranted by authentic facts: and as magnetism does not affect the smell, the taste, or any other sense of the body, it is improbable, to the greatest degree, that it should have any effect upon animal bodies. For though there are, without doubt, particles of iron in almost every part of an animal body, yet these particles are so subdivided and calcined, and bear so small a proportion to the other elements, that, in a natural state, the magnet has no action upon them.

Magnet, in *Metallurgy* and *Chemistry*. Iron ores may generally be discovered to be such by the magnet; for almost all of them will be attracted by it either before or after ignition. A strong artificial magnet, well hung, and used as a needle, will best serve for this purpose. It will also readily find, and separate any little bits of iron or steel from other things, and particularly iron or steel from those of other metals. It will likewise discover whether tools, &c. are made of steel, or whether they are iron case-hardened; for the steel will receive a strong touch, when the other will hardly receive any. For the use of the magnetic needle, in *Mining*, see Needle. According to Neumann, the magnet is almost totally soluble in spirit of nitre, and partially in the vitriolic and marine acids. See Iron, *Ores of*.

Magnet, *Armed*, denotes one that is capped, cased, or set in iron or steel, in order to make it take up a greater weight, and also more readily to distinguish its poles. As both magnetic poles together attract a much greater weight than a single one, and as the two poles of a magnet are generally in opposite parts of its surface, in which situation it is almost impossible to adapt the same piece of iron to them both at the same time; therefore it has been commonly practised to adapt two broad pieces of soft iron to the poles of a load-stone, and to let them project on one side of the magnet, because in that case, the pieces of iron being rendered themselves magnetic, another piece of iron could be conveniently adapted to their projections, so as to let both poles act at the same time. Those pieces of iron are generally held fast upon the magnet by means of a brass or silver box. The magnet in this case is said to be *armed*, and the pieces of iron are called the *armature*.

In *fig.* 7. *Plate* VI. A B represents the magnet; C D, C D, represent the armature or pieces of iron, the projections of which are D, D, and to which the piece of iron, F, is made to adhere. The dots E C D C D represent the brass box, having a ring, E, at its upper part, by which the armed magnet may be suspended. Thus the two poles of the magnet, which are at A and B, are made to act at D D, where the straight piece of iron, F, may be conveniently applied.

For this purpose, and to avoid the armature, artificial magnets have been made in the shape of a horse-shoe, having their poles in the truncated extremities; for which reason they have more power than the straight magnetic bars.

When a piece of natural magnet is required to be armed, the first operation is to find out its poles; then let the magnet be properly shaped, *viz.* either in the form of a terrella, or in the more usual one of a parallelopipedon, in which latter case care must be had to let the poles fall about the middle of two opposite surfaces, in which direction the magnet ought to have the greatest length possible; it having been often observed, that a natural magnet is weakened in power much more by cutting off a part of its length, in the direction of the poles, *viz.* so as to make the magnetic axis shorter, than in any other direction.

After having shaped the magnet properly, let two plates of soft iron be made, equal in breadth to those surfaces where the poles stand, and to project a little way on one side of the stone, as shewn in the figure. Those projections D, D, must be much narrower than the breadth of the plates. For magnets smaller than one ounce, the lower surfaces of the projections, to which the iron, F, is to be applied, need not be larger than about one-tenth of an inch; and from a quarter to half an inch is sufficient for larger magnets.

The thickness of the plates C D, C D, must be proportioned to the power of the magnet; there being a certain size which is the properest for any magnet, a larger or smaller thickness than which being not so advantageous. This thickness cannot be easily determined without actual trial; hence the best way is to make them very thick at first: then filing a little off, and examining the power of the magnet alternately: for the power increases gradually till a certain degree, at which limit the filing ought to be discontinued.

It is indifferent whether the armature be kept on by tying, or by a box; whether of metal or of wood; but as the box is the most permanent, this ought to be preferred: and it may be made of any metal excepting iron or steel.

When the magnet is spherical, the armature, or pieces of iron, must be adapted to that surface, and each to cover about a quarter of it.

What has been here said about the natural magnet, is equally applicable to the artificial ones; so that many magnetic bars may be joined together, and may be armed so as to form a very powerful *compound magnet*.

The armature rather strengthens the power of the magnet, for the same reason for which a piece of iron affixed to a magnet tends to render it more powerful.

If the artificial magnets be made in the shape of a horse-shoe, or of a semicircle, then there is no need of the armature, it being sufficient to join them together, either by rivetting or by a box; and, indeed, even with straight bars, the compound magnet may be made without the armature; but then, as the two magnetic poles cannot act in the same plane, it is proper to have two of those compound magnets, for the purpose of giving more conveniently magnetism to other bodies.

By this means the late Dr. Gowin Knight constructed two very powerful artificial magnets, or magazines of magnetic bars, which are now in the repository of the Royal Society. Each of these magazines consists of 240 bars, disposed in four lengths, so as to form a parallelopipedon, every length containing 64 bars. All these bars are kept together by means of iron braces, and the whole is suspended upon pivots and a proper wooden pedestal or carriage, so as to be easily placed in any required position. For a farther description of those magnetic magazines, see the Phil. Trans. vol. lxvi. p. 591.

Mr. Michell directs to increase the power of a natural magnet, if it be small and short, by laying a great number of iron bars at its ends, after the manner of supporters, care being taken to apply the proper poles: if it be pretty long, so as to allow room for it, by touching it also double with several bars, according to its bulk, applying them to all sides at once. To increase the power of a large magnet, instead of placing supporters, he advises to put a large piece of iron, of the thickness and breadth of the magnet, at each end of it. This piece of iron should be either three or four times as long as it is thick, or else short, and three or four

four times as large at the end not touching the magnet, as at the other: in the former of these ways, there are to be placed on one side, in the other case at the broad end, as many supporters as can conveniently stand there. This, if the magnet be very short, may be sufficient; if it be long, it should besides be touched double. If the magnets to be thus improved be very susceptible of magnetism, they should have much thicker armour than is generally used, because they will thus retain more magnetism; and the armour should be so fastened, that the hoops, &c. used for that purpose may not stand in the way of applying any thing to the ends, or the sides; for it is much the best way to make any short magnets magnetical in their armour, because they will retain more power by this means. But Mr. Michell apprehends, that the best way of managing very large magnets, would be to slit them, in a direction parallel to the axis, into several long bars of the length of the stone, and having made them magnetical singly, to put them into their armour, in the manner directed for compound artificial magnets. The steel bars used for artificial magnets may be armed and made magnetical, like the natural magnets. Armed compound artificial magnets may be made of several bars exactly of a length, with armour nicely fitted to them. The bars should have the same proportions as those of single unarmed magnets; they should be touched singly, and put into their armour, as they are touched, with the poles of the same denomination the same way. The armour should be pretty thick, and should have a wedge of iron applied to it, whilst the bars are putting in, and till the whole is bound together and finished; for which reason the case, that keeps the armour together at bottom, should be put on before any of the bars are in. The iron wedge should always continue applied to the magnet, but when it is used; for this will be a great preservation to it; though with all this precaution, it will lose a great deal of its first strength, in a very little time. Mr. Michell directs an occasional magnet of this kind to be made in the following manner: let there be a small box, about an inch deep, six inches long, and three or four wide; in the bottom of this box fix two bars of iron, at each end one, about $\frac{3}{8}$ths of an inch square, reaching quite across the ends and through holes in one side, and projecting a little way beyond; these projecting ends serve as feet to lift with, like those of the common armed natural magnet: the faces of these feet should lie in the same plane with each other, and they may be reduced, by taking off the edges, to about half the breadth of the bar, in the flat way of the box. When the magnet is wanted, apply a wedge of iron to the two feet that come through the side of the box; and having made any number of the six-inch bars as magnetical as may be, place them one by one with their edges against the two iron bars in the box, and with their poles of the same denomination the same way, pushing them close against the side of the box, which will keep them from turning over and lying flat-ways. Having placed as many of the six-inch bars as are required in this manner, lay two or three doubles of flannel, or something else that is soft and spungy, over them, and press them against the two iron bars with the lid of the box, and fasten it down. Such a magnet as this may be easily taken to pieces and retouched, and set together again, as occasion shall serve. A magnet of this kind, consisting of three dozen of six-inch bars, will lift fifty pounds avoirdupois.

The following experiment will shew in what circumstances a magnet can lift the greatest weight. Take a magnetic bar, and find by trial an oblong piece of iron, about four inches long, and of a weight little greater than the magnet will support. It is plain, that if you affix this iron to one pole of the magnet, the moment you remove your hand, the iron will drop; but if, before you remove the hand, you present another larger piece of iron just under the lower extremity of the former, and within half or three-quarters of an inch from it, you will find that the magnet will then support that piece of iron which it could not support before, when a secondary piece of iron was not under it. In short, a magnet can lift a greater weight of iron from over another piece of iron, as an anvil, or the like, than from over a table.

The reason of which property is, that in the former case, the iron basis, or inferior piece of iron, becoming itself in some measure magnetic, helps to increase the magnetism of the first piece of iron, and consequently tends to increase the attraction between it and the magnet; which does not take place when the iron is lifted from over a table, or something else which is incapable of acquiring any magnetism.

In order to render this property more intelligible, suppose that a piece of iron be affixed to the north pole of a magnet; it is plain, that by the action of the magnet the part of it that stands next to the magnet has acquired a south polarity, and its other, or inferior extremity, has acquired a north polarity, the attraction being a consequence of this acquired magnetism, and being greater or smaller in proportion as that acquired magnetism is more or less powerful; consequently, whatever tends to increase that magnetism in the piece of iron, must likewise increase the attraction. Now, when another piece of iron is under the former, that other piece of iron, being within the sphere of action of the magnetic bar, becomes magnetic, and the part of it which is contiguous to the north pole of the magnet acquires the south polarity; but this is contiguous to the lower end, which is the north pole, of the first piece of iron, therefore it must increase that north polarity, and, of course, the south polarity of the upper end of the first piece of iron, which stands next to the magnet.

In fact, if, instead of the secondary piece of iron, you put the south pole of another magnet at a little distance below the lower extremity of the suspended iron, you will produce the same effect, *viz.* will increase the attraction between it and the north pole of the first magnet; but if you present the north pole of the second magnet under it, then you will produce the contrary effect, *viz.* will weaken its magnetic power, and, of course, diminish the attraction.

The variable power of a magnet may be shewn by suspending iron to it, in the following manner. Suspend a magnet in a place that is not much shook, and apply to it as much weight of iron as it will just support. For this purpose, the magnet, either natural or artificial, ought to be armed, or made in the shape of a horse-shoe, *viz.* so as to have the poles in one plane; in this form the effect being more conspicuous. Let a hook or a scale, like those used for a balance, be fastened to this iron. On the day following, you may put a little more weight into the scale, which the magnet will support. One or two days after, a little more weight may be added; and so on; the power of the magnet increasing daily: and, though this increase of power is neither unlimited nor very regular, being affected in some measure by the vicissitudes of heat and cold, &c.; yet, upon the whole, the power of a magnet will be considerably increased by this artifice.

It is very remarkable, that if, in the course of the operation, the iron were to drop from the magnet, on replacing it, you will find that the magnet will no longer support as much

much weight as it did a moment before, fo that now you muft diminifh the weight, though in the courfe of the following days you may increafe it gradually again: hence, in placing the weights into the fcale, or upon the hook, care muft be taken not to give it any jerk, fo as to caufe the iron to fall off; otherwife a great deal of the work will be loft.

The reafon of this experiment is, that the iron being rendered magnetic, tends to ftrengthen the magnetifm of the magnet, in the fame manner as any other magnet endeavours to render magnetic any ferruginous fubftance that is placed within its fphere of action. When the iron falls off, the magnet lofes part of the acquired power, efpecially if the magnet had acquired more than its point of faturation, there having been removed the caufe which kept it up; and when the iron is replaced, the magnet will not recover the loft power very readily, becaufe there is required a confiderable time to communicate a certain degree of magnetic power to a hard ferruginous fubftance, as the magnet is, efpecially when that magnetifm muft be communicated by the action of a proportionably weak magnet, like the iron weight.

According to Æpinus's hypothefis of the magnetic fluid, this experiment is explained thus: The magnetic fluid in a magnet is not equally difperfed through its fubftance; but one pole, or half of it, is overcharged, and the other undercharged. There is a ftrong attraction between the undercharged part and the fuperfluous quantity of magnetic fluid in the overcharged part, and the reftoration of the balance is in great meafure prevented by the hardnefs or fome other quality of the magnet. Now, when the iron is affixed to the magnet, it becomes magnetic, *viz.* that part of it which is contiguous to the overcharged pole of the magnet, becomes undercharged, and the oppofite one becomes overcharged. In this fituation, the undercharged part of the iron, endeavouring to draw the magnetic fluid of the magnet towards itfelf, accumulates or draws it ftill nearer to that overcharged pole of the magnet; and, on the other fide, the overcharged part of the iron being contiguous to the undercharged pole of the magnet, tends continually to drive the magnetic fluid away from that undercharged pole of the magnet; but the power of the magnet, according to the hypothefis, depends on the unequal diftribution of the magnetic fluid, therefore the action of the iron, by endeavouring continually to increafe that unequal diftribution, muft increafe the power of the magnet.

It follows from this experiment, that a magnet is apt to lofe much of its power when kept without any iron affixed to it.

Magnet, *Arfenical, Magnes Arfenicalis*, in *Chemiftry*, denotes a mixture of equal parts of arfenic, fulphur, and antimony, melted together over the fire, and condenfed in manner of a ftone.

It is a very gentle cauftic, and was firft invented by Angelus Sala. It fucceeds very well in taking down fungous flefh in wounds. It has its name magnet, becaufe, being worn during malignant difeafes, it is fuppofed to preferve the wearer from infection, by a magnetical power.

Magnet, *Artificial*, is a fteel or iron bar, impregnated with the magnetic virtue, fo as to poffefs all the properties, and be ufed inftead of the natural load-ftone.

Before we proceed to give a particular account of the various methods that have been practifed for making artificial magnets, it may not be improper to premife fome general obfervations on the communication of magnetifm. We have already more than once had occafion to remark, that when a piece of iron or fteel, or, in fhort, of any ferruginous body, is prefented to a magnet, within a proper diftance of one of its poles, it becomes inftantly magnetic the part of it which is neareft to the magnet acquiring the contrary polarity, &c.

This acquired magnetifm is ftrongeft with foft iron, and weakeft with hardened fteel, or with the brittle fort of caft iron; the other forts of iron or ferruginous bodies acquiring a ftronger or weaker power, according as they approach the hardnefs of the latter, or the foftnefs of the former. But the permanency of the acquired magnetifm follows juft the reverfe of this rule; fo that the hardeft fteel retains it for many years with little or no diminution; whereas very foft iron lofes it entirely the moment it is removed from the influence of the magnet; the other ferruginous bodies preferving it for a longer or fhorter time, according as they participate more of the nature of hard fteel, or of that of foft iron. Hence it may be deduced, that, in general, the beft method of making artificial magnets confifts in applying one or more powerful magnets to pieces of the hardeft fteel, becaufe thofe pieces will thereby acquire a confiderable power, and will retain it for a long time; taking care, in this operation, that the north pole of the magnet or magnets be applied to that extremity of the piece of fteel which is required to be made the fouth pole, and that the fouth pole of the magnet be applied to the oppofite extremity. In the fame manner as a piece of fteel or iron is rendered magnetic, a weak magnet may be rendered more powerful, or its power may be reftored when loft.

It is evident, that in this method the operator fhould have one or more magnets, by the application of which the fteel, or other ferruginous body, may be rendered magnetical; therefore it may be afked, by what means is magnetifm originally given to fuch artificial magnets, as are faid to have that power imparted without the interference of any magnet? The anfwer to this queftion is, that no magnetifm at all can be communicated to any ferruginous body whatever, without the action of another magnet; and that, in the method vulgarly called, of giving magnetifm to fteel, &c. without the aid of a magnet, the beginning of the magnetic power is communicated from the earth, which is a real magnet; and, therefore, there is no magnetifm communicated but by the action of another magnet. See art. 32, *fupra*.

There are fome particular circumftances which demand attention, in order to enable us to afcertain the beft method of conftructing artificial magnets.

1. The nature of the body muft be adapted to the power which is to render it magnetic; remembering, that the foft ferruginous bodies both acquire and lofe magnetifm eafier than thofe which are harder.

2. The fhape of the bodies is to be confidered next, experience fhewing that an oblong one is in general preferable to any other. In cafe of fteel bars, they ought to be quite hard, in order to acquire the greateft poffible power, provided one has magnets fufficiently ftrong for the purpofe; and if cylindrical, their diameters ought to be about one-fifteenth of their length; or, if not cylindrical, their thickneffes ought to be fuch as nearly to equal the weight of the cylindrical bars of the fame length, and the diameter of which may be about one-fifteenth of their lengths.

3. Several magnets are much preferable to a fingle one, for the purpofe of communicating magnetifm; in the application of which, it muft be remembered, that the fouth pole of the magnet produces a north pole in the part of the ferruginous body to which it is applied, and that the north pole of the magnet produces a fouth pole in the part, &c.

4. If it were required to conftruct a ftrong magnet, when the operator has either no magnet at all, or a very weak one, he muft proceed gradually. It being impoffible for a hard and

and large steel bar to receive any sensible degree of magnetism from the action of the earth, or of any other weak magnet, the operator must begin with giving magnetism to several small and soft steel bars, impregnating one at a time by means of the weak magnet, or, if he have no magnet, by means of one or more iron rods properly situated, which in that case are real, though weak magnets. Then, by joining in a proper manner the small steel bars already made magnetic, he may communicate a stronger power to larger and harder steel bars; which will be capable of impregnating bars still larger; and so on.

It has been asserted by various authors, that if a short bar of soft steel be repeatedly stroked from end to end, in any situation, by a sufficiently long iron bar, likewise kept in any situation, the steel bar will thereby acquire a considerable degree of magnetism: from which it might perhaps be inferred, that there is no necessity of deriving the origin of magnetism from the earth. But an accurate investigation of this pretended fact has shewn, that the steel bar will not acquire magnetism in every situation. Indeed, as the bar of iron is rendered more or less magnetic by the earth in every situation, except that which is perpendicular to the magnetical line; in a random way of making the experiment, it is almost impossible to keep the bar so near that direction as to acquire no magnetism at all from the earth; but if, in rubbing the steel bar, the iron one be kept in a situation nearly perpendicular to that of the magnetical line, then the steel will acquire no magnetism at all. Besides, when the iron bar is kept in any situation, the degree of magnetism which is communicated to the bar, is greater or less in proportion as the direction of the bar is nearer to or farther from that of the magnetical line; which proves, beyond a doubt, that the communicated magnetism is originally derived from the earth.

In order to make a piece of iron acquire magnetism from the earth, let the following process be pursued: Take a bar of soft iron, about two or three feet long, and between one-half of an inch and two inches thick, (such are some kitchen pokers,) and place it in the magnetical line, *i. e.* in the direction of the dipping needle, if this be at hand, or straight up in higher latitudes N. or S. than 40°, but horizontally when nearer to the equator than the above-mentioned degree of latitude. Then place a magnetic needle on a pin, and holding the pin in your hand, present the needle to the various parts of the bar from top to bottom, and you will find, that in this island the lower half of the bar is possessed of the north polarity, capable of repelling the north and of attracting the south pole of the needle, and the upper half is possessed of the south polarity, capable of repelling the south and of attracting the north pole of the needle. The attraction is strongest at the very extremities of the bar; it diminishes as it recedes from them, and vanishes about its middle, where no one pole of the needle is attracted in preference to the other. In short, in that situation, the iron bar is as much a magnet as any piece of iron that stands within the influence of a magnet.

If you turn the bar top-side down, the extremity of it, which was south pole when it stood uppermost, will now become north pole, and the other extremity will become south pole.

In the southern parts of the world, the lower part of the bar is a south pole; or, to be more explicit, when in any part of the world the bar is situated in the magnetic line, the extremities of the bar will acquire the polarities corresponding to the nearest poles of the earth.

In order to fix in an iron bar the magnetism which the earth has communicated to it, the following circumstances should be regarded. The very soft iron acquires the greatest degree of magnetic power in the shortest time, but loses it with the same quickness; so that, if the preceding experiment be performed with a bar of that sort of iron, the magnetism communicated to it by the earth will not be permanent; but if it be made red-hot, and be left to cool in the magnetic line, or if it be repeatedly struck with a hammer, whilst standing in the magnetic line, it will thereby acquire a small degree of permanent magnetism; which power, however, either by leaving the bar for some time in an improper situation, or by inverting and striking it again, will be soon destroyed.

When the iron is somewhat harder, the acquired magnetism lasts much longer; though a longer time, or longer operation, be required in order to render it magnetic.

As the constant action of a weak magnet or a ferruginous body continually tends to increase the magnetism of that body, so the iron bars, which are left in the direction of the magnetic line for a considerable time, become continually more strongly magnetic, and the acquired power becomes more permanent.

The reason why iron, by long standing, by hammering, &c. acquires a permanent magnetism from the earth, whereas by the mere position, in a short time, the power is not at all permanent, seems to be the unequal texture of the iron: suppose, for instance, that a piece of iron is composed of hard and soft particles, or of some, through which the magnetic power moves very easily, and others, through which it moves very slowly. The former then of those particles acquire the magnetism at first from the earth, and lose it very easily; but by continuing in the same position, or by being softened, &c. the hard particles gradually acquire magnetism from the former, and having once acquired it, retain that power for a long time. It is, besides, very probable, and in certain circumstances actually proved, that some sort of iron becomes harder by being kept long exposed to the atmosphere.

The method of making magnets of this kind, by means of a natural magnet, and even without the assistance of any magnet, was suggested many years ago by Mr. Servington Savery, and particularly described in the Phil. Transf. N° 414. See also Abridgment, vol. vi. part ii. p. 260, &c. But as his method was tedious and operose, though capable of communicating a very considerable virtue, it was little practised. A more simple method was proposed by Mr. Arnold Marcel, nephew to Mr. Leeuwenhoeck, and is described in the Phil. Transf. (See Martyn's Abr. vol. vi. part ii. p. 278.) It is as follows: "In the year 1776," says he, "making several further observations about the magnetical force which I found in great pieces of iron, I made use of a large iron vice, about 90lbs. weight, in which I fixed a small anvil of about 12lbs. Upon the bright surface of this anvil I laid the steel, to which I would give the virtue, in a position of north and south, which happened to be in a diagonal of the square surface of the anvil; then I took a piece of iron, one inch square, and 33 inches long, of about 8lbs. weight, having at one end the figure here represented (*fig.* 8.) brightly polished at A, and taper at the other end. Then I held fast down the piece of steel upon the anvil with one hand, and with the other I held the iron bar aforesaid perpendicular, with its point, A, upon the steel, and, pressing hard, I rubbed the steel with the iron bar towards me, from north to south, several strokes, always carrying the bar far enough round about, to begin again at the north, to prevent the drawing back of the magnetical force. Having thus given ten or twelve strokes, I turned the steel upside down, leaving it in the same position as to north and south, and,

after

after rubbing it and turning it, till I rubbed it about 400 times, it received by degrees more and more ſtrength, and at laſt had as much as if it had been touched by a ſtrong load-ſtone. The place where I began to rub, was always that which pointed to the north when the needle was hung, the end where I had ended the ſtroke turning to the ſouth. Sometimes it has happened, that in a few ſtrokes I gave the ſteel its virtue; nay, even in the very firſt ſtroke, one may give a great deal to a ſmall needle. This way I have given the magnetical virtue to needles of ſea compaſſes, made of one piece of ſteel, ſo ſtrongly, that one of the poles would take up three quarters, and the other a whole ounce of iron. Although theſe needles were anointed with linſeed oil, which made a hard coat, to keep them from ruſting, yet they kept the virtue; but in ſtrengthening theſe ſorts of needles, I rubbed by turns firſt to the right and then to the left ſide.

"The ſame way I brought the virtue into the point of a knife, ſo that it would ſuſtain $1\frac{3}{4}$ ounce.

"I brought the ſaid virtue into four ſmall pieces of ſteel, each one inch long, and $\frac{1}{4}$th of an inch broad, as thin as the ſpring of a watch. Theſe four pieces I joined together, as into an artificial load-ſtone, weighing 18 grains troy, and then it did draw up and ſuſtain an iron nail, which weighed 144 grains troy. This artificial load-ſtone has now theſe ſix years been tumbled about, and been lying among iron and ſteel, and in any poſition, and yet it has rather got more than loſt any of its virtue.

"The magnetical virtue being thus brought into iron or ſteel, I have farther obſerved, that that end where the ſtroke was begun, would draw to the north, and where the ſtroke ended, to the ſouth, in whatever ſituation the ſteel had been laid upon the anvil to give it the virtue. I took a piece of ſteel, and rubbed it from one end to the middle, and then from the other end to the middle, and found it had two north poles, one at each end, and the middle a ſouth pole.

"Further, beginning to rub from the middle towards each end of another piece of ſteel, I found it to have at each end a ſouth pole, and in the middle a north pole."

A very eaſy way of giving magnetiſm to a ſmall piece of ſoft ſteel, is the following: Take two pokers of ſoft iron, or two iron bars, of about an inch ſquare, and more than three feet in length, keep them in the magnetical line, or if in this iſland, perpendicularly, as ſhewn in *fig.* 9. Then let the piece of ſteel, C B, be either faſtened to the edge of a table, or be held by an aſſiſtant; and placing the lower extremity of the bar A B, and the upper extremity of the bar C D, both on the ſame ſide, and in the middle of the ſteel, ſtroke the ſteel from the middle towards its extremities, moving the end of the bar, C D, from the middle of the piece of ſteel towards its end C, at the ſame time that the end of the bar, A B, is moving from the middle of the piece of ſteel to its other extremity B; and when the bars are arrived to the ſaid extremities, remove them from the ſteel, and apply them again to the middle, and ſo on; thus ſtroking the piece of ſteel about forty or fifty times on every ſide, will give it a conſiderable degree of magnetiſm.

It is evident, that if in this experiment, when the iron bars are arrived to the extremities of the ſteel, you bring them back to the middle of it, by drawing them along the ſurface of the ſteel, the experiment will not ſucceed, becauſe the magnetic power communicated by their rubbing the ſteel in one direction, will be deſtroyed by their contrary motion.

Dr. Gowin Knight was the firſt who brought this kind of magnets to their preſent ſtate of perfection, ſo as to be of much greater efficacy than the natural ones. The reſult of his method, though the proceſs itſelf was kept ſecret, was firſt publiſhed in the Phil. Tranſ. for 1744, vol. xliii. art. 8, and Phil. Tranſ. for 1745, art. 3. See alſo vol. xliv. for 1747, art. 2. Mr. Wilſon has communicated to the public Dr. Knight's method; who informs us, that having provided himſelf with a large quantity of clean filings of iron, he put them into a large tub, that was more than one-third filled with clean water: he then, with great labour, worked the tub to and fro for many hours together, that the friction between the grains of iron by this treatment, might break off ſuch ſmaller parts as would remain ſuſpended in the water for ſome time. The obtaining of theſe very ſmall particles in ſufficient quantity, ſeemed to him to be one of the principal deſiderata in the experiment. The water being thus rendered very muddy, he poured the ſame into a clean earthen veſſel, leaving the filings behind; and when the water had ſtood long enough to become clear, he poured it out carefully, without diſturbing ſuch of the iron ſediment as ſtill remained, which now appeared reduced almoſt to impalpable powder. This powder was afterwards removed into another veſſel in order to dry it; and this proceſs was ſeveral times repeated. When a ſufficient quantity of this fine powder was procured, he made a paſte of it with linſeed oil; preferring this vehicle, becauſe it contained a conſiderable quantity of the phlogiſtic principle. With theſe two ingredients he made a ſtiff paſte, which he well kneaded, before he formed it into convenient ſhapes, and then upon wood, and ſometimes on tiles, in order to bake or dry it before a moderate fire, at about a foot diſtance from it. In about five or ſix hours it generally attained a ſufficient degree of hardneſs. When theſe baked pieces were become old, he gave them their magnetic virtue in any direction he pleaſed, by placing them between the extreme ends of his large magazine of artificial magnets for a few ſeconds or more, as he ſaw occaſion. By this method, the virtue they acquired was ſuch, that when any one of thoſe pieces was held between two of his beſt ten-guinea bars, with its poles purpoſely inverted, it immediately of itſelf turned about to recover its natural direction, which the force of thoſe very powerful bars was not ſufficient to counteract. (Phil. Tranſ. vol. lxix. part i. for 1779, art. 5.) However, the method of making artificial magnets was diſcovered and publiſhed by Mr. John Michell, in a Treatiſe of Artificial Magnets, printed in 1750, and by Mr. John Canton, in the Phil. Tranſ. for 1751, vol. xlvii. art. 6, p. 31. The proceſs for this purpoſe was alſo found out by others, particularly by Marul Uitgelezze Natuurkund. Verhand, tom. ii. p. 261, and Du Hamel, Hiſt. Acad Roy. 1745 and 1750.

Mr. Michell's method of making magnets is as follows: prepare a dozen bars of ſteel, of about $1\frac{1}{4}$ ounce weight each, ſix inches long, and half an inch broad: let theſe be hardened with a full, but not too great heat: let one end be nicked all round with a chiſſel, to diſtinguiſh it from the other; and the ends of the bars ſhould be cleaned after hardening, either upon a ſmooth ſtone, or razor-grinder's wheel: the ſize and ſhape of the bars may be varied at pleaſure, provided that the length be proportioned to the thickneſs. The beſt ſort of ſteel is that which has no veins of iron in it, and Mr. Michell has found the common bliſtered ſteel at leaſt equal to any other. When any magnet does not anſwer expectation, it will be proper to harden it over again, with a greater or leſs degree of heat, till it proves better. In order to preſerve theſe bars, contrive a box, that ſhall have two pieces of iron, about an inch long

each

each, fixed upright in the middle of each end, over againſt each other, at the diſtance of ſix inches from outſide to outſide. Theſe pieces of iron may be about a quarter of an inch ſquare, and ſhould be filed pretty ſmooth on the ſides. Againſt theſe are to be placed, with their edges towards them, the twelve magnetical bars, ſix on one ſide, with their ſouth, or north poles one way, and ſix on the other ſide with the ſame poles the contrary way. It is neceſſary to obſerve that theſe bars muſt neither be taken out, nor put in, all, or too many on a ſide at once; for if two only be left, with their poles of the ſame denomination the ſame way, without one or more on the other ſide to counter-balance their effects, they will damage each other: and if two of the ſame ſide be taken out together, or laid with their poles of the ſame denomination together, after they are taken out they will alſo damage one another: and if this be the caſe it will be proper to reſtore them before they are uſed, after the manner preſcribed for making of magnets. In order to make the marked ends of theſe bars ſouth poles, and the other ends north poles, place ſix of them in a line north and ſouth, bringing the unmarked end of one, to touch the marked end of the next throughout; the marked ends lying towards the north, which will be ſome advantage to them. Then take an armed magnet, and placing it with both poles upon one of the bars, the north pole towards the marked end, which is to be a ſouth pole, and the ſouth pole towards the unmarked end, which is to be a north pole, ſlide it backwards and forwards from end to end of the whole line of bars three or four times, taking care that they all touch. Then taking it off, remove the two endmoſt bars into the middle, and paſs over them again three or four times. Having thus touched the bars, it will not be improper to turn them with the other ſide uppermoſt, and to touch them over again on that ſide as before, omitting the endmoſt bars, till they are removed into the middle, where they alſo are to be touched.

If an unarmed magnet, either natural or artificial, be uſed, lay the bars in a line as before; place the ſouth pole of the magnet upon the marked end of the endmoſt bar, and ſlide it over the whole line to the end: then taking that pole off, place the north pole upon the ſame bar in its room, not at the extremity of the bar, but towards the middle, and ſlide it back again; then change the poles again, obſerving to ſet the magnet on at the middle of the bar, and ſlide it to the other end, as at firſt. Having done this four or five times, remove the two endmoſt bars into the middle, and placing the ſouth pole of the magnet upon the marked end of them, ſlide it to the unmarked end; and then, placing the north pole upon the unmarked end, ſlide it to the marked end. Let this be repeated three or four times; and turning the bars with the other ſide upward, repeat the ſame proceſs again. When the magnets are weak, it may be neceſſary to touch the bars, according to the preceding direction, before they are hardened, when they will receive the magnetic virtue more eaſily; then, making the whole dozen magnetical, in the manner hereafter preſcribed, till they are as ſtrongly ſo as they will be in their ſoft ſtate, harden one half; and having made theſe again magnetical with the remaining half that are ſoft, harden thoſe alſo, and proceed. But if the magnets are too weak to perform properly, even in this caſe, recourſe muſt be had to ſmaller bars of ſteel, which ſhould alſo be ſoft; and if theſe fail, bars of iron muſt be uſed. Having communicated a ſmall degree of magnetiſm to ſix of the bars, let the other ſix, which are unmagnetical, be laid in a line, in the ſame manner as the former: and let A B, (*Plate* VI. *Magnetiſm, fig.* 10.) repreſent this line, conſiſting of ſix bars, though three only are delineated. The line drawn acroſs at the end of each bar, repreſents the mark diſtinguiſhing that end which is to be made the ſouth pole, from the other. Let C D, E F repreſent the ſix bars already made magnetical: theſe lean againſt each other at the top, and are ſeparated by a piece of wood, or other matter except iron, about the tenth of an inch at the bottom. The three magnets in C D have all their ſouth poles downward, and are placed towards the unmarked ends of the bars in the line which are to be north poles; and the three magnets in E F have all their north poles downward, and are placed towards the marked ends of the bars which are to be ſouth poles. Slide theſe ſix magnetical bars thus placed, backward and forward three or four times over the whole length of the line. Then taking them off, having firſt brought them to touch at the bottom, remove the two endmoſt bars of the line into the middle, and replacing the magnetical bars upon them, as before, paſs over thoſe again. Then taking them off, and turning the bars in the line with the other ſide upward, go over them again in the ſame manner, excepting the endmoſt bars; which, when thoſe in the middle are touched, are to be removed thither, to be touched in their turn. Thus the bars in the line will give a ſtronger power to that of the other ſix, by which they were touched; and, therefore, theſe latter may now be laid down in a line, and retouched, after the ſame manner, with the latter: when this is done, lay thoſe down again, and retouch them with the others: repeat this operation a few times, firſt touching one ſet, and then the other, till they have acquired as much magnetiſm as they will retain; or till they will receive no additional force by any farther repetition. The ſix-inch bars, made magnetical after this manner, when properly hardened, will ſingly lift, by one pole, a piece of iron, weighing a pound or better, if it be of a proper form; and ſix ſuch bars will touch a line of freſh bars of the ſame ſize, to their full perfection, by three or four times ſliding over them; except the endmoſt, which muſt always be removed into the middle. As ſeveral magnets laid together with their poles of the ſame denomination the ſame way, will greatly injure one another, unleſs they have ſomething to counteract them, it is abſolutely neceſſary not to place two of them, of a ſide, or together; but ſingly, one on one ſide, and one on the other, making them to lean together, that they may reſt againſt one another at the top: at the bottom they are preſerved from injuring one another, by being placed upon the bar which is to be made magnetical. In like manner, they muſt not be taken off two of a ſide together, but ſingly, firſt on one ſide, and then on the other. But the readieſt way of taking them off is firſt to bring them to touch one another at the bottom, in the ſame manner as they do at the top, and then they may be removed at once, and upon occaſion ſet on again; only obſerving not to ſeparate them again at the bottom, till they are placed upon the bar which they are to touch. The reaſon of removing the two bars at the ends of the line, in order to their receiving a greater virtue, ſeems to be, that the ſix magnets, employed in touching, are endeavouring to make that part of the bar which is not included between them magnetical, in a contrary direction from that which is included between them. As this laſt is the direction of magnetiſm deſigned, the former endeavour would be injurious; and it is prevented by two cauſes: one of which is the power, whereby the ſteel reſiſts in a degree every endeavour, either to make it magnetical, or to deſtroy its magnetiſm; and the other is the power of the bars already in ſome meaſure magnetical, which lie at both ends of the bar that is touched. Now this laſt power is wanting at one extremity of thoſe bars that are placed at the ends; and conſequently not having a ſufficient force fully to reſiſt the contrary endeavour

vour of the magnets employed in touching them, they become lefs magnetical than the others, which have a fufficient force. Though in the line of bars, when making magnetical, each bar has only one at each end to fupport it (thofe magnets that are planted at the ends of the others to preferve them being called fupporters) againft the contrary endeavour of the fix, made ufe of to touch it; and this does very well; yet fome will receive an additional force by being fupported with larger magnets; or inftead of thefe, two or three of their own fize, at each end; thofe at the marked end all with their north poles touching it, and thofe at the unmarked end all with their fouth pole touching it. And becaufe there will be two or three north poles, and as many fouth poles together amongft the fupporters, at the other end from the bar to be touched, that have nothing to counteract them, it will be proper to place the fouth pole of another magnet among the north poles, and the north pole of another among the fouth poles, that they may not hurt one another, which they otherwife will do.

The manner above defcribed is called the *double touch*: and Mr. Michell obferves, that two magnets will give more ftrength to a bar of their own fize, when ufed after this manner, than a fingle magnet equal to five of the former in ftrength, when applied after the manner of the fimple touch. This ingenious writer has defcribed a frame, contrived for holding feveral of the fix-inch bars, when they are ufed in touching large bars, and when they cannot be conveniently held in the hand; for an account of which we muft refer to his excellent pamphlet, already cited, p. 45, &c. ed. 2. He obferves, that the form of magnets is of very little confequence with regard to their receiving the magnetic virtue, provided that they have a fufficient length in proportion to their bulk. The ftraight bars may be made fquare, round, or flat: though the flat are moft convenient for touching; and probably fomewhat ftronger. Thefe may alfo be pointed at the ends, as in *fig.* 11, in order to render them lighter, and to increafe their power of lifting; though pointed bars are not fo proper for touching. The magnet may be made in the form of a horfe-fhoe, as in *fig.* 12, where a wedge of iron is fuppofed to be applied to the poles of it; and it will thus lie in a narrower compafs, a wedge of iron may be applied to its two poles, and it will lift by both poles at once. The magnet may be alfo made annular, which is a plain flat bar, bent flatways inftead of edgeways; and a femicircular magnet may be bent flatways, like the annular, or edgeways, like the horfe-fhoe; and two magnets of this kind may be conveniently placed together, in order to preferve each other.

The poles of a magnet may be converted by placing the bars which are to retouch it, with their north poles towards its north pole, and the fouth poles towards its fouth pole. In doing this, they fhould be placed on at the middle, and flid once or twice backwards and forwards, before it is fupported; and then that which was the north pole muft be fupported as a fouth pole by north poles: and that which was the fouth pole, as a north pole by fouth poles. In order to make a bar magnetical, fo that it fhall have feveral poles, fupport it at the places where the poles are defigned to be, with poles of a contrary denomination from thofe defigned; and if any place is fupported with fouth poles, the next places on either fide muft be fupported with north poles, and *vice verfâ*. Having done this, confider each piece included between any two fets of fupporters, as a feparate bar, to be made magnetical, with its fouth pole towards the north fet of fupporters, and its north pole towards the fouth fet, and touch it accordingly. Magnets of this fort will not do well, unlefs they are very long; and at beft they are always weak, and will very foon be injured; fo that they fhould only be made occafionally.

Mr. Michell has alfo publifhed a method of obtaining magnetifm by means of three iron bars, without the affiftance of a natural load-ftone, for which we fhall refer to his pamphlet, p. 60, &c. and proceed to defcribe the method defcribed by the ingenious Mr. Canton.

This gentleman bas fucceeded fo well in his attempts to convey a confiderable magnetic virtue to bars of hardened fteel, as to be able to impregnate fuch bars with this virtue to as high a degree, at leaft, as any bars of the fame weight and dimenfions, which he had feen or heard of; and to as high a degree, as he apprehends, the fame bars, in their prefent ftate, are capable of being impregnated. Mr. Canton was able, in about half an hour's time, to communicate to fix bars of hardened fteel, at firft entirely deftitute of any magnetic virtue, the utmoft virtue they were capable of receiving; and that without the mediation or affiftance of any natural load-ftone, or of any artificial magnet. Mr. Canton has publifhed the defcription of his procefs with fuch directions, that any perfon may readily perform the fame. For this purpofe procure a dozen bars; fix of foft fteel, each three inches long, $\frac{1}{4}$ inch broad, and $\frac{1}{20}$th of an inch thick, with two pieces of iron, each half the length of one of the bars, but of the fame breadth and thicknefs: and fix of the hard fteel, each $5\frac{1}{2}$ inches long, $\frac{1}{2}$ an inch broad, and $\frac{3}{20}$ths of an inch thick, with two pieces of iron of half the length, but the whole breadth and thicknefs of one of the hard bars; and let all the bars be marked with a line quite round them at one end. Then take an iron poker and tongs, or two bars of iron, (*Plate* VII. *Magnetifm*, *fig.* 1.) the larger they are, and the longer they have been ufed, the better; and fixing the poker upright between the knees, hold to it near the top one of the foft bars, having its marked end downward, by a piece of fewing filk, which muft be pulled tight with the left hand, that the bar may not flide; then grafping the tongs with the right hand a little below the middle, and laying them nearly in a vertical pofition, let the bar be ftroked by the lower end, from the bottom to the top, about ten times on each fide, which will give it a magnetic power fufficient to lift a fmall key at the marked end; which end, if the bar was fufpended on a point, would turn towards the north, and is, therefore, called the north pole, and the unmarked end is, for the fame reafon, called the fouth pole of the bar. Four of the foft bars being impregnated after this manner, lay the other two (*fig.* 2.) parallel to each other, at the diftance of about one-fourth of an inch between the two pieces of iron belonging to them, with a north and a fouth pole againft each piece of iron; then take two of the four bars already made magnetical, and place them together, fo as to make a double bar in thicknefs, the north pole of one being even with the fouth pole of the other; and the remaining two being put to thefe, one on each fide, fo as to have two north and two fouth poles together, feparate the north from the fouth poles at one end by a large pin, and place them perpendicularly with that end downward, on the middle of one of the parallel bars, the two north poles towards its fouth, and the two fouth poles towards its north end; flide them backward and forward three or four times over the whole length of the bar, and removing them from the middle of this, place them on the middle of the other bar as before directed, and go over that in the fame manner; then turn both the bars with the other fide upward, and repeat the former operation: this being done, take the two from between the pieces of iron, and placing the two outermoft of the touching bars in their room, let the other two be the outermoft of the four to touch these with; and this process being repeated till each pair of bars has been touched three or four times over, which will give them a considerable magnetic power, put the half dozen together after the manner of the four (*fig* 3.), and touch with them two pair of the hard bars, placed between the irons at the distance of about half an inch from each other; then lay the soft bars aside; and with the four hard ones let the other two be impregnated (*fig*. 4.), holding the touching-bars apart at the lower end near two-tenths of an inch, to which distance let them be separated after they are set on the parallel bar, and brought together again after they are taken off; this being observed, proceed according to the method already described, till each pair has been touched two or three times over. But as this vertical way of touching a bar will not give it quite so much of the magnetic virtue as it will receive, let each pair be now touched once or twice over, in their parallel position between the irons (*fig*. 5.), with two of the bars held horizontally, or nearly so, by drawing at the same time the north of one from the middle over the south end, and the south of the other from the middle over the north end of a parallel bar: then bringing them to the middle again without touching the parallel bar, give three or four of these horizontal strokes to each side. The horizontal touch, after the vertical, will make the bars as strong as they can possibly be made; as appears by their not receiving any additional strength, when the vertical touch is given by a greater number of bars, and the horizontal by those of a superior magnetic power. This whole process may be gone through in about half an hour, and each of the larger bars, if well hardened, may be made to lift twenty-eight troy ounces, and sometimes more. And when these bars are thus impregnated, they will give to a hard bar of the same size its full virtue in less than two minutes; and will, therefore, answer all the purposes of magnetism in navigation and experimental philosophy, much better than the load-stone, which is well known not to have sufficient power to impregnate hard bars. The half dozen being put into a case (*fig*. 6.), in such a manner as that two poles of the same denomination may not be together, and their irons with them as one bar, they will retain the virtue they have received; but if their power should, by making experiments, be ever so far impaired, it may be restored without any foreign assistance in a few minutes. And if, out of curiosity, a much larger set of bars should be required, these will communicate to them a sufficient power to proceed with, and they may in a short time, by the same method, be brought to their full strength. Mr. Canton, by the same process, communicated magnetic virtue to two large bars, each half an inch square, 10½ inches in length, and weighing nearly ten ounces and twelve pennyweights, to such a degree, that one of them lifted by one of its ends seventy-nine ounces and nine pennyweights: and a flat semicircular magnet, weighing an ounce and thirteen pennyweights, was made to lift, by applying its two ends together to an iron wedge, ninety troy ounces. The same ingenious gentleman could also readily deprive his bars of their virtue; and change the poles of a natural load-stone, by placing it in an inverted direction, between the contrary poles of his larger bars, laid down at some distance from each other, in the same straight line continued at the distance of about a quarter of an inch from either of the poles, without touching the stone with either of the bars.

The method in which the steel he made use of was hardened is as follows: having cut a sufficient quantity of the leather of old shoes into very small pieces, an iron pan is provided, which a little exceeds the length of a bar, is wide enough to admit of two bars side by side without touching each other on the pan, and at least an inch deep. This pan is nearly half filled with the bits of leather, upon which are laid the two bars, having fastened to the end of each a small wire for taking them out: the pan is then quite filled with the leather, and placed on a gentle flat fire, being covered and surrounded with charcoal. The pan, being brought to somewhat more than a red heat, is kept about half an hour, and the bars are suddenly quenched in a large quantity of cold water. Mr. Horne, in his Essays on Iron and Steel, p. 147, claims the merit of directing this process for hardening Mr. Canton's bars.

In order to communicate the magnetic virtue to a steel bar, to the needle of a compass, &c. by means of two magnetic bars, place the bar or needle, A B (*fig*. 7.), upon a table, then place the two magnetic bars C D, E F, straight up upon A B, at a little and equal distance from the middle of the bar A B, and in such manner, as the south pole, D, of one of the bars may be nearest to that end of the bar, A B, which is required to become the north pole, &c. then these two bars must be slid gradually towards one extremity of the bar, keeping them constantly at the same distance from each other; and when one of the magnetic bars, for instance C D, is arrived at A, then they must be slid the contrary way, till E F arrives at B; and thus the bar, A B, must be rubbed a greater or smaller number of times, till it will be found by trial to have acquired a considerable power. When the magnetic bars are powerful, and the bar, A B, is of very good steel, and not very large, a dozen of strokes are fully sufficient. When the magnetic bars are to be removed from the bar A B, care must be had to bring them to the same situation where they were first placed, *viz*. at a little and equal distance from the middle of the bar A B, and then they may be lifted up.

In this operation, the effect of the bars may be improved several ways, which will be found necessary when the bar, A B, is proportionably large, and it is required to give it the greatest possible power. This may be effected, first, by joining the magnetic bars at top, interposing a piece of wood or other substance, except iron, to keep them apart, as shewn in *fig*. 8; for in this manner, the upper poles of the bars being contiguous, will tend to strengthen each other, and, of course, their lower poles will also be strengthened. Secondly, by placing the bar, to be rendered magnetic, between two bars of soft iron, or two other magnets, as shewn in *fig*. 9, or in the manner before directed. Thirdly, the magnetic bars may be inclined the contrary way, after the manner used by Mr. Æpinus (*fig*. 10.); so that the magnets C D, E F, may make an angle of about fifteen degrees with the bar A B.

The bar, A B, may, in the same manner, be rendered magnetic by means of an armed magnet, as shewn in *fig*. 11; or by a horse-shoe magnet, as shewn in *fig*. 12, placing both the poles of the magnet in contact with the bar, &c.

In all these methods, the bar to be rendered magnetic must be stroked on every side; and, in order to let the magnetic centre fall just in its middle, care must be had to stroke one-half of the bar just as often as the other half.

Whenever a steel bar, or in general a piece of ferruginous substance, is rendered magnetic by applying two bars, or whenever two magnetic poles are applied to it at the same time, as used in this and the preceding experiment, the operation is usually called the *double touch*, in distinction from the *single touch*, which is when only one magnetic pole is applied to it.

As artificial magnets are frequently made in the shape of a semicircle, or like a horse-shoe, for the sake of bringing both poles in the same plane, the crooked steel bars of which they are constructed are made magnetic in the same manner as the straight bars, excepting only, that the magnetic bars which are used for it must follow the curvature of the steel bar; thus, if it be required to render magnetic the piece of steel A B C (*fig.* 13.), place it flat upon a table, and to its extremities apply the magnets D F, E G; joining their extremities F, G, with the conductor or piece of soft iron F G. Then apply the magnetic bars H, I, to the middle of the piece A B C, and stroke it with them, from end to end, following the direction of the bent steel, so that on one side of it the magnetic bars may stand in the direction indicated by the dotted representation L K. In this manner, when the piece of steel has been rubbed a sufficient number of times on one side, turn the other side upwards, and repeat the operation till it has acquired a sufficient degree of magnetism.

In this operation, the same precautions must be followed as were recommended for the method of communicating the magnetism to straight bars, *viz.* the magnets D F, E G, as well as the magnets H, I, must be placed so that their south poles must be towards that extremity of the bent steel which is required to be made the north pole, and their north poles towards the other extremity. The magnets, I, H, must be first placed on the middle of the bent steel; and after having drawn them over one leg of it as often as over the other, in order to let the magnetic centre fall just in the middle of the bent steel, they are removed, &c.

If a person have only one magnetic bar, or a terrella, with which he wishes to give magnetism to a needle or other bar, the only way of effecting it is, to apply one pole of the terrella, or magnetic bar, A B (*fig.* 14.), to one extremity, C, of the needle, and to draw it all along the surface of it till it reaches the other extremity D; then the magnet being removed, must be applied again to the extremity C, and must be drawn over the needle as before. Thus the needle must be rubbed several times, by which means it will acquire a considerable degree of magnetism.

It must be observed, that the extremity of the needle which the pole of the magnet touched last, acquires the contrary polarity. Thus, in the present instance, if B be the north pole of the magnet, the extremity, D, of the needle will afterwards be found to have acquired the south polarity, and the other extremity, C, the north.

In this operation it is evident, that, after the first stroke, when the magnet is applied again to C, this extremity, having acquired the north polarity, will have that power destroyed by the vicinity of the north pole, B, of the magnet; so that it seems that every stroke undoes what was done in the preceding. However, the fact is, that by repeating the strokes the power is increased; but, in general, this method will never be so advantageous as when more than one magnetic pole is used: hence it ought not to be used, excepting in case of necessity, *viz.* when one has only one magnetic bar or terrella.

Artificial magnets are preferable to the natural ones in a variety of respects. Mr. Michell mentions particularly, that they may be had at much less expence and trouble, and in greater plenty; that they are much superior to natural magnets in strength, and better able to communicate the magnetic virtue in proportion to their strength; that they are more easily restored to their former strength when they are at any time damaged; that they furnish several poles; and that they may be had in every form. Cavallo's Magnetism. Cavallo's Philosophy, vol. iii.

MAGNETICAL AMPLITUDE, *Azimuth*, and *Declination*, see the several substantives.

MAGNETICAL *Island*, in *Geography*, an island in the South Pacific ocean, near the N.E. coast of New Holland, discovered by Capt. Cook in the year 1770, and so named from its seeming to have some effect on the compass. S. lat. 19° 8'. W. long. 213° 22'.

MAGNETICAL *Line*, is that line in which a needle would place itself, if left at entire liberty to turn itself as well vertically, as horizontally. See DIPPING.

MAGNETICAL *Meridian*. See MERIDIAN.

MAGNETICAL *Needle*. See NEEDLE. See also *Mariner's* COMPASS, DIPPING, and the article MAGNET.

MAGNETICAL *Paradox*. Upon the table A B (*Plate* VI. *Magnetism*, *fig.* 15.) place a piece of iron wire, not above a tenth of an inch long. Let the magnetic bar, E F, be held at about four or five inches above the table, with either pole downwards, and in such a place, as that the perpendicular let fall from it to the table may touch the table at G, *viz.* two or three inches distance from the iron wire: these distances, however, are subject to a good deal of variety, arising from the power of the magnet.

By the action of the magnet the iron wire will elevate one of its ends, as represented by C D, forming with the table an angle, which is larger the nearer the wire comes to the point G, where it stands quite erect.

In this situation, if you give gentle knocks to the table, the wire, C D, will gradually proceed towards G, every knock making it jump up and advance a little way. The reason of which a superficial observer would immediately attribute to the attraction between the magnet and the iron wire, which, being not sufficiently strong to raise the wire from the table, has just power enough to draw it a little nearer to the point G, when the motion of the table lifts it up.

Thus far the experiment shews nothing extraordinary; but if it be repeated with only this variation, *viz.* that the magnet, instead of being held above the table, be placed below it, *viz.* at H I, the event will be, that the wire, which will now make an obtuse angle towards G, as represented by K L, on knocking the table, will gradually recede from the point G, shewing as if the magnet repelled it; which has given to this experiment the name of *magnetical paradox*; for, in fact, the magnet attracts the wire.

This phenomenon results from the directive property of the magnet acting at a greater distance than the attractive.

In order to explain the immediate cause of this phenomenon, it must be considered, that the wire K L, (*fig.* 16.) being rendered magnetic by the action of the magnet H, is inclined to it according to the above-mentioned laws of the dipping needle; but, on account of its weight, and because it is supported not in its centre, but by one end, namely K, which stands upon the table, it does not incline so much as it ought to do, if it were freely suspended by its centre, the end, K, now being a little higher than its proper situation. Let M N be the perpendicular, which passes through the centre of the wire. Now, when by the motion given to the table, the wire is made to jump; this, whilst remaining in the air, will take its proper inclination, as shewn by *r* Q, its centre remaining in the same perpendicular M N; for the directive power of the magnet, H, acts at a greater distance than its attraction. In this situation it is evident, that a perpendicular P O, let fall from the lower extremity, *r*, of the wire, touches the table in a point farther from G than the point K; and as the wire after the jump comes down to the table again with the proper inclination, *viz.* parallel to *r* Q, it follows, that now its lower end must touch the table at O: and thus every knock will

will force it to recede a little more from the point G, which lies just over the magnet H.

The same explanation applied to the first part of the experiment, will shew that the wire must in that case, *viz.* when the magnet is held above the table, approach continually the point G.

This experiment may be diversified by using iron filings, instead of the iron wire; for, in the first case, the filings dispersed over the table will be gradually collected about the point G; and in the latter case, the filings placed about the point, G, will be gradually forced to recede from that point. Cavallo's Magnetism, chap. vii.

MAGNETICAL *Variation.* See VARIATION and DECLINATION.

MAGNETIS LAPIS, in the *Natural History of the Ancients*, the name given in different ages to two very different substances. The earliest Greek authors expressed by it the load-stone, which became afterwards called *Heraclius lapis*, (see IRON, *Ores of*, and MAGNET); and then the word *magnes* was applied to a very different stone brought from the same place, the neighbourhood of Magnesia in Lydia.

This was a fine beautiful and bright substance, of a pure white, and so very bright and glossy, as to bear a resemblance to polished silver. It was dug in large masses, and was of a texture capable of being wrought into any figure. Accordingly it was in great esteem among the ancients, who had it wrought into vessels for the use of the table.

It seems to be wholly unknown at present among the nations we have commerce with. Hill's Theophrast. p. 79.

MAGNETISM, MAGNETISMUS, that quality or constitution of a body, and its pores, whereby it is rendered *magnetical*, or a *magnet*.

Magnetism is found to be a transient power, capable of being produced and destroyed again.

MAGNETISM *of the Earth* is that property of the terrestrial globe, from which the magnetism of the ordinary magnets, the direction of the magnetic needle, and other phenomena are derived, and upon which they necessarily depend. This hypothesis is evinced by so many observations, that no philosopher can be sceptical enough to dispute its truth. The principal reasons, says Mr. Cavallo, which prove it, almost to a demonstration, are, first, that almost all the phenomena which may be exhibited with a usual magnet, may be also exhibited with the earth, as far as it may be tried; and secondly, that vast masses of iron, or ferruginous substance, actually magnetic, are dug out of the earth almost in every part of it.

"The phenomena of the compass and of the dipping needle, in different parts of the world, and the magnetism naturally acquired by soft iron when properly situated, are exactly imitated by a common magnet, or a terrella; but the only phenomenon, which has not been observed with respect to the earth, and which is the principal property of the usual magnets, is the attraction of a piece of iron, or other ferruginous substance. For instance, if a piece of iron be presented to either of the poles of a common magnet, it will be powerfully attracted by it; but if it be presented to the middle of the magnet, the attraction will be found to be hardly perceivable, or at least incomparably weaker than at the poles; in conformity to which, it might be expected, that a piece of iron should be attracted more powerfully downwards, when near the poles of the earth than when near the equator; which attraction, being combined with the attraction of gravitation, ought to be known by the difference of the weights of the same piece of iron, when weighed near the poles, and when weighed near the equator; for, if the magnetic attraction of the earth upon it be at all sensible, it ought to weigh more in the former case than in the latter. But this difference of weights has not yet been ascertained; however, if it were to be tried with all the accuracy necessary for so nice an experiment, I am inclined to think that it would be found to answer; *viz.* that the same piece of iron would be found to weigh somewhat more in places nearer to the poles, than it does nearer to the equator: but, even in case no such difference of weights were observed, it would be improper to infer that the earth does not exert any magnetic attraction towards the iron on its surface, and that this attraction is not stronger near the poles than near the equator; because, first, the magnetism of the earth being very weak, the difference of the attraction in different places must be likewise very small, notwithstanding the directive power is considerably strong; for, as was explained under the article MAGNET, the latter of those powers extends to a much greater distance than the former. And, secondly, it must be considered, that the equatorial diameter of the earth is longer than its polar diameter, and that the attraction of gravitation, or the weight of bodies, decreases in proportion to the squares of the distances from the centre of the earth; in consequence of which, if we abstract the magnetic attraction, and consider only the attraction of gravitation, it will appear that the piece of iron must weigh more when weighed near the poles than when weighed near the equator; namely, because when near the poles, it stands actually nearer the centre of the earth than when near the equator.

"If the magnetic needle pointed always due north and south, or always within a certain distance of those points, it would shew that the earth has two fixed magnetic poles, either coinciding with its astronomical poles, or at some distance from the same; but the continual variation of the magnetic needle shews, that those magnetic poles of the earth move with respect to the surface of the earth, and, on this account, many suppositions have been offered to the public by divers ingenious persons. It was imagined, that there was a large magnet inclosed within the body of the earth, which being not fixed to the external part, moved with respect to it, and, consequently, occasioned the variation of the needle." To this purpose, Mr. Whiston alleges that the earth on which we live, includes within it a vast spherical magnet, concentrical thereto, having its own poles, meridians, equator, and parallels; and all much of the same general nature of those with small terrellæ, or spherical load-stones, in the possession of the curious among us.

The power of a good terrella, or a spherical load-stone, says this author, as it affects a needle a foot long, is equal to the magnetic power of that internal load-stone about two and a half, or three diameters of such load-stone. From which consideration, the quantity of magnetic attraction at all distances from the internal load-stone, for needles a foot long, may be determined; and from the same consideration it appears, that the diameter of this internal load-stone is about eleven hundred and fifty miles. To which we add, that, in regard sir Isaac Newton has demonstrated, that the power of gravity diminishes within the earth, and is less there than at its surface, nearly in the proportion of its greater nearness to the centre, the magnetic power, at two thousand nine hundred miles distance from us, and nearly one thousand and sixty from the earth's centre, which is $\frac{10}{24}$ of the power of gravity here, will be somewhat greater than the power of gravity there; which limit is worthy our attention, gravity being stronger than magnetism on the one side of it, and weaker on the other; we mean, as it affects needles of one foot diameter. At that limit, therefore, at least

leaſt near the magnetic poles, iron a foot long will be twice as heavy, and fall twice as faſt, as any other natural body, *viz.* by the union of thoſe two equal powers, gravity and magnetiſm; and of conſequence, above that limit, ſuch an iron will be leſs than twice as heavy, below it more than twice as heavy, as any other natural body.

The earth's internal load-ſtone, he ſays, is not fixed to our upper parts, but is moveable with reſpect to them, and actually revolves on the earth's axis, from eaſt to weſt, in a certain long period of time; as appears beyond contradiction, from the conſtant variation of the horizontal needle weſtward; as well as the regular increaſe of inclination of the dipping needle.

The only way to render this motion, *i. e.* the variation, poſſible and intelligible (to uſe Dr. Halley's words), is to ſuppoſe it to turn about the centre of a globe, having its centre of gravity fixed and immoveable in the ſame common centre of the earth. This moveable internal ſurface muſt likewiſe be looſe, and detached from the external part of the globe, which may be reckoned the ſhell, and the other the nucleus or inner globe, included within it, with a fluid medium between. Now, from the variation's moving weſtward, it is plain, that the foreſaid nucleus has not preciſely attained the ſame degree of velocity with the exterior parts in their diurnal revolution: but ſo nearly equals it, that in three hundred and ſixty-five revolutions, the difference is ſcarcely ſenſible; and muſt probably have ariſen from hence, that the impulſe, whereby the diurnal motion was impreſſed on the earth, was given to the external parts, and thence communicated to the internal.

This internal magnet has one central pole northward, in the nature of the poles of our common load-ſtones; but its ſouthern pole appears not to be central, but rather circular, and that at a great diſtance from the ſouthern pole of the earth.

The northern magnetic pole is *now* ſituate, ſays Mr. Whiſton, about the latitude of $76\frac{1}{2}$ degrees; *i. e.* $13\frac{1}{2}$ degrees from the north pole of the earth, and about 30 degrees eaſtward from the meridian of London.

The ſouthern magnetic circular pole has its centre, or central pole, nearly in the parallel of 60 degrees; and, in a meridian paſſing along the eaſt coaſt of Borneo, about 117 degrees eaſtward of London. Its radius is alſo an arc of a great circle of about 44 degrees.

The reſpective motion of the internal magnet, or the velocity, *v. g.* of its north pole, appears to be 27 deg. 0 min. in 144 years, *i. e.* upwards of one degree in five years; ſo that it makes an entire revolution in 1920 years. Hence, as the number of degrees in the upper earth's diurnal revolution is to the number of days in the revolution of the internal magnet, *i. e.* as 1 is to 700,000, ſo is the reſpective motion of this magnet from eaſt to weſt to the real motion of the upper earth from weſt to eaſt; or, to ſpeak ſtrictly, ſo is the difference of their motions from weſt to eaſt to the entire motion of the upper earth the ſame way. This external fixed earth has therefore communicated almoſt all its motion already to the internal magnet; and can communicate no more than this difference of their motion, and that only in an infinite term of years; or, in other words, this real internal motion can never be the ſeven hundred thouſandth part ſwifter than it is at preſent. This internal motion, therefore, began with the commencement of the diurnal motion of the upper earth; and has gone on ſtill faſter and faſter by the communication of that motion through the intermediate fluid. Since, therefore, action and re-action are equal, and tend to contrary parts, this internal load-ſtone, thus accelerated by the upper part, muſt have all along retarded that upper earth, and made the diurnal rotation ſtill ſlower and ſlower. This acceleration on one ſide, and retardation on the other, muſt have been very great at the firſt beginning of the diurnal motion, when the difference of their motion was equal to the entire motion itſelf, and muſt have been diminiſhing ever ſince. To which cauſe is probably owing that acceleration of the moon's motion with reſpect to that of the earth, ſince the time of the old aſtronomers, firſt taken notice of by Dr. Halley, and embraced by ſir Iſaac Newton. And the ſame conſideration ſeems to ſuggeſt a method for determining the age of the world; for, were the proportions of the quantity of matter in the upper earth to the internal magnet, with the tenacity of the intermediate fluid, &c. known, one might go back from the known difference of their velocity now, and find thoſe differences and quantities of motion themſelves, *à priori*, in all paſt ages; or, were the velocity of the firſt diurnal rotation of the upper earth known, we might geometrically determine, *à priori*, how long ago that rotation began, or how ancient our earth is.

The variation of magnetic needles from the azimuth of the meridians of the internal magnet is derived, ſays Mr. Whiſton, from the difference of the ſtrength of the ſeveral parts of the internal magnet's ſurface; which as it is only to be known by experience, that variation cannot be determined before-hand, unleſs where there are good accounts how much it had formerly been; it being probable, that it returns round, and will be the ſame in any year of the next revolution of the internal magnet, that it has been in the like year of any former revolution, or will itſelf have a revolution in about 1920 years. Mr. Whiſton adds, that the two fixed magnetic poles in our upper earth firſt introduced by Dr. Halley, as neceſſary to ſolve the irregularity of the variation of the horizontal needle from the meridians of the moveable internal magnet, ſeem not to have any juſt foundation in nature, the like irregularities being found in the common terrellæ, or ſpherical load-ſtones, and being beſt accounted for from the compoſition of the magnets, which are found to have parts of different degrees of purity, ſtrength, and perfection; ſo that where the parts are weaker than ordinary, the ſtronger neighbouring parts prevail, and draw the needle that way: not but Dr. Gilbert's notion of prominent and depreſſed parts on magnets may have ſome room, and be allowed to contribute ſomewhat, to ſuch variations. See VARIATION.

On the ſuppoſition above ſtated, the variation ought to be regular; that is, it ought to move in all parts of the world, ſo as to anſwer to the two points of the large internal magnet; which, however, is not the caſe.

In order to ſupply the deficiency of this hypotheſis, it was farther imagined, that there were four magnetic poles within the earth, which were moveable with reſpect to each other, and that, therefore, the variation of the needle ought to be derived from all their actions conjointly; which would render the theory of the variation exceedingly intricate: but, notwithſtanding this difficulty, a regularity, within certain laws and limits, ought to be ſtill obſervable reſpecting the variation; but no ſuch regularity has been yet proved. In ſhort, without detaining our readers any longer on this point, it will ſuffice to ſay, that no theory yet offered has been ſufficient to foretel, with certainty, the variation of the needle for any future period of time, or for any place diſtant from thoſe in which obſervations have been frequently made. See DECLINATION, COMPASS, and VARIATION.

Mr. Cavallo is of opinion, that the magnetiſm of the earth ariſes from the magnetiſm of all the magnetic ſub-

ſtances

ftances therein contained, and intermixed with other bodies; that the magnetic poles of the earth may be confidered as the centres of the polarities of all the particular aggregates of the magnetic fubftances: and that thefe principal poles muft change place, relatively to the furface of the earth, according as the particular aggregates of magnetic fubftances within the earth are in fome manner or other altered, fo as to have their power diminifhed, increafed, approached, or removed from the principal poles.

Although no regularity has been eftablifhed with refpect to the variation of the needle, yet as the different fituation of the magnetic poles within the earth occafions a great variety of appearances, and as the right underftanding of thefe varieties may be of great ufe to thofe who wifh to inveftigate this intricate fubject, the developement of which will be of vaft ufe to mankind; we fhall here fubjoin the principal cafes, as they are drawn up by Mr. Lorimer, which feem to be poffible, relating to the pofition of the magnetic poles; conceiving, agreeably to the moft natural and moft generally received fuppofition, that they are two, and that they lie on the furface of the earth. Thefe cafes are no more than four, *viz.*

Cafe 1.—If the magnetic poles of the earth had coincided with the true poles thereof, there could have been no declination or variation of the mariner's compafs in any part of the world, that is, if the earth be uniformly magnetical; for, in that cafe, the needle, in pointing to the magnetic poles, would always have pointed to the true poles alfo; this needle would therefore be neceffarily directed along the courfe of the meridian, or, in other words, it would have no declination or variation either to the eaft or weft thereof.

Cafe 2.—If the magnetic poles were fituated in the fame meridian, and in oppofite parallels; upon that meridian which paffes through the magnetic and true poles, from the one of the magnetic poles to the other, and upon the oppofite meridian all along, there could be no declination, for the reafon mentioned in the former cafe. Likewife, upon the equator, there would be no declination; for though if one of the magnetic poles were only to act upon the needle, in paffing along the equator to the diftance of 90 degrees in longitude eaft or weft, the declination would increafe, fo that at 90 degrees diftance from the line of no declination it would be equal to the angle contained between the magnetic and true poles; yet, as the other magnetic pole, in this cafe, is always within the fame diftance of the needle, it will act upon the oppofite end of it with equal force, and confequently, will keep it parallel to itfelf all round the equator. But in going from the equator north or fouth, the declination would increafe fo as to be 180 degrees on the little arches or fpaces of the meridian contained between the true and the magnetic poles, which is the greateft poffible declination in all cafes whatfoever. It muft be farther obferved on this cafe, that the lines of no declination, including thofe arches of 180°, form two great circles of the globe along the meridian and the equator, croffing one another at right angles, and dividing the furface of this globe into four quarters, two in each hemifphere; the one hemifphere having weft declination in the north, and eaft declination in the fouth half thereof, and in the oppofite hemifphere it would be juft the reverfe; fo that each of the arches or femicircles of no declination would have eaft declination on the one fide of them, and weft declination on the other. The fmall arches of 180° declination, which are between the true and magnetic poles, may be reckoned in all cafes as a part of the lines of no declination; for there indeed the needle conforms itfelf to the meridian as well as in the other parts of the circle, though its ends are reverfed. In fhort, as all the lines of declination do coincide and terminate in the magnetic and true poles, fo thefe arches of 180° are a kind of limit, making with each of thofe lines, as in the prefent cafe, a curve line or figure returning into itfelf; which figures, from 180° between the poles, to 0 declination upon the equator, do each of them include a fpace larger than the other, till at laft they fill up the whole quarter of the furface of the globe, and conform themfelves, as nearly as poffible, to the fhape and figure thereof.

As a variety of this cafe, it may be added, that the magnetic poles may be fituated in the fame meridian, but in parallels which are not oppofite. In that cafe, the only alteration which could happen is, that in the hemifphere in which the magnetic and true poles are neareft to each other, the figures formed by the lines of declination become fmaller, and the correfponding figures in the oppofite hemifphere, larger. The line of no declination, which, in this cafe, reprefents the equator, would alfo be proportionably nearer to thofe poles which are neareft to one another.

Cafe 3.—If the magnetic poles were fituated in oppofite meridians, and in oppofite parallels; upon thofe meridians which pafs through the magnetic and true poles there could be no declinations, for the reafons mentioned in the former cafes. But upon the equator, eaftward or weftward, to the diftance of 90° in longitude, the declination would actually increafe, fo as there to be equal to the angle which meafures the diftance between the true and the magnetic poles; and from thence it would, in the fame manner, decreafe for the other 90° to the oppofite meridian. The declination lines of 10°, 20°, &c. as far as the greateft declination upon the equator, in this cafe, become arches or curves, which conform themfelves, as nearly as may be, to the courfe and direction of the lines of no declination, and are called lines of the firft order. But the lines of the greateft equatorial declination crofs one another at the diftance of 90° in longitude from the meridian or circle of no declination, fomething in form like the letter X, or like two Gothic arches joined at the vertex. They are called lines of the fecond order, and may very properly be confidered as the boundary between the lines of the firft and third order, as the lines of no declination are always boundaries between the lines of eaft and weft declination. In this cafe, thofe lines of no declination, including the arches of 180°, form only one great circle along the meridian, dividing the furface of this globe into two hemifpheres, in the one of which there is eaft declination, and in the other weft declination.

From the greateft equatorial declination to the arches of 180°, the declination lines of the third order are curves returning into themfelves, and in fhape nearly refembling parabolas erected upon thofe arches of 180°.

As a variety of this cafe, it may be added, that if the magnetic poles were fituated in oppofite meridians, but in parallels which are not oppofite, then, in that hemifphere in which the true and the magnetic poles approached neareft to one another, the figure formed by the lines of declination would be fmaller, and in the oppofite hemifphere the correfponding figures would be larger in proportion.

Cafe 4.—This cafe is a very extenfive one, *viz.* when the magnetic poles are fituated neither in the fame nor in oppofite meridians; and this feems to have been the real pofition of thofe poles ever fince any obfervations of the declination of the magnetic needle have been made.

In this cafe, then, the lines of no declination cannot be either in the direction of a meridian or along the equator, as in the former cafe, but in a kind of curves, which are varioufly inclined to both; and they divide the furface of the globe into two parts, but thefe parts are not hemifpheres, as in the laft cafe, for they may be of a very different extent. If the magnetic poles be fituated in meridians nearly oppofite, the curvature of thofe lines will not be fo great, that is, they become more like to Cafe 3. But as the magnetic poles approach nearer to the fame meridian, the curvature of the lines of no declination becomes greater, till they almoft touch one another, fomething in form like the figure of the number 8, and at laft they complete the two great circles, as in Cafe 2. The lines of the fecond order, which correfpond to the greateft equatorial declination, if the magnetic poles be fituated in meridians nearly oppofite, have a declination nearly equal to the angle formed between the magnetic and true poles, as in Cafe 3; but as the magnetic poles approach towards the fame meridian, this declination decreafes, till at laft it entirely vanifhes, as in Cafe 2. The other declination lines in this cafe are fo fimilar to the former, that they require only to be referred to it. Laftly, it muft be obferved, that whether the magnetic poles be fituated in oppofite parallels or not, makes as little difference in this as in the former cafe.

Hitherto the magnetic poles have been confidered to lie on the furface of the globe; but if we attentively confider the fituation which they may more likely have, it will appear, that in all probability they are not fituated near the furface of this globe, but at fome depth below it; at leaft this muft be the cafe with the fouth pole; for, fince the water of the fea is incapable of magnetifm, and the fouthern hemifphere, efpecially about the fouth pole, contains a vaft deal more fea than land; it is plain that the fouth magnetic pole muft be fituated at leaft near the bottom of the fea; in confequence of which, the variation of the needle in that hemifphere muft be different from what it would be if the magnetic pole were fituated on the furface of the terraqueous globe. The fame may be obferved with refpect to the fituation of the north magnetic pole. Befides this, we muft alfo confider the irregularities arifing from the unequal and irregular fituation of land and fea; it being natural to conceive, that large tracts of land on one fide of the magnetic needle will draw it away from the real meridian, whereas a large ocean can produce no fuch effect. This, however, is fubject to a great deal of variety, arifing from the nature of the land, the depth of the fea, the nature of the ground at the bottom of the fea, &c. It appears, therefore, that a great many caufes combine to act upon the magnetic needle, occafioning it to decline from the true meridian, and that it is almoft impoffible to form a ufeful theory upon it.

Magnetism, *Theory of.* As for the caufes of magnetifm, or the manner in which attraction, repulfion, and other magnetic phenomena are produced, we have yet no hypothefis, that will fatisfactorily account for them. Plutarch tells us, the magnet attracts iron, by emitting fome fpiritual effluvia, whereby the contiguous air being opened and driven on either fide, does again drive that contiguous to it; and thus the action being communicated round, the iron is thereby protruded; but this is contradicted by the equally vigorous action of the load-ftone in vacuo, and in the open air. Others of the ancients afcribe the action of a magnet to a foul that animates it; and others to an unknown fympathy between the effluvia of the iron and thofe of the magnet.

An opinion, that has much prevailed among the moderns is that of Des Cartes, maintained by Malebranche, Rohault, Regis, &c. and even admitted and confirmed by Mr. Boyle, &c. In this it is fuppofed, that there is continually flowing, from the poles of the world, a fubtle, impalpable, and invifible matter, channelled or ftriated; which matter, circulating round the earth, in the planes of the meridians, re-enters at the pole, oppofite to that from which it iffued, and paffes again through the poles parallel to its axis: that the magnet has two poles anfwerable to thofe of the earth; and that out of thefe there iffues a matter like that juft mentioned; and that this matter, entering at one of the poles, gives the impulfe, whereby iron tends to the magnet, and produces what we call attraction. Now, befides the magnetical matter re-entering the poles of the magnet, there is always a certain quantity thereof circulating round the magnet, compofing a kind of vortex about it. The fpace wherein this matter moves, is the fphere of activity of the magnet, within which its attractive faculty is confined.

Dr. Gilbert, in his work "De Magnete," folio, printed 1600, concludes, from fome experiments which he made, that the needle is not attracted by the magnet, but turned into its pofition, by what he calls a difponent virtue; which he fuppofed to furround the ftone, fomewhat in form of an atmofphere.

As to its directive faculty, or the inclination of a needle touched with it to the poles of the world, and its dip to a point beneath the horizon, they follow from the fame principle; fince, were the magnet or needle to have any other fituation, the magnetic matter would ftrike on its other furface in vain; and, not being able to get admiffion, would, by degrees, change its fituation, till fuch time as its pores correfponded to the courfe of the magnetical matter; which fituation having once acquired, it would ceafe to move, the magnetical matter then ceafing to difturb it.

The form or effence of a magnet, therefore, is fuppofed to confift in its being perforated by an infinite number of parallel pores; fome of which are difpofed to admit the ftriated matter from the north pole of the world, others that of the fouth: hence the north and fouth poles of the magnet.

Mr. Hartfoeker maintains, that the magnet is no more than a common ftone, full of an infinite number of hollow prifms; which, by the diurnal motion of the earth, are ranged parallel to each other, and nearly parallel to the axis of the earth. Thefe prifms have their cavities filled with an extremely fubtle matter, which, by the diurnal motion of the earth, is paffed from prifm to prifm; thus making a circulation, and returning into the prifms, where it firft began. From thefe principles he deduces all the phenomena of the magnet; and M. Andry does the fame, from the doctrine of alkali and acid.

As to the directive power of the magnet, Mr. Whifton inclines to think it mechanical; and afcribes it to magnetic effluvia circulating continually round the load-ftone; of which circulations, he thinks, there are evident indications in magnetic experiments; as Mr. Boyle thinks there are of the magnetifm, or magnetic effluvia of the earth; though thefe effluvia are never yet rendered fenfible, as electric effluvia began to be in his time. But the attractive power Mr. Whifton thinks entirely immechanical, as the power of gravity is; not being able to devife any fuch motion of a fubtle fluid belonging to the load-ftone, as will account for the attractive power in the fefquiduplicate proportion of the diftances reciprocally; though if he could, yet would that be no more than to remove the immediate power of the Supreme Being one ftep farther; the laft refort of all mechanical principles whatever being in the immechanical power and efficacy of the Deity.

Dr. Knight deduces from feveral experiments the following propofitions, which he offers, not fo much to explain the nature of the caufe of magnetifm, as the manner in which it acts: the magnetic matter of a load-ftone, he fays,

 moves

moves in a ſtream from one pole to the other internally, and is then carried back in a curve line externally, till it arrive again at the pole where it firſt entered, to be again admitted; the immediate cauſe why two or more magnetical bodies attract each other, is the flux of one and the ſame ſtream of magnetical matter through them: and the immediate cauſe of magnetic repulſion is the conflux and accumulation of the magnetic matter. His opinion was, that this earth had originally received its magnetiſm, or rather that its magnetical powers had been brought into action, by a ſhock, which entered at about the ſouthern, and paſſed out at the northern tropic. This, according to his ſtatement, was the courſe of the magnetic fluid, and he ſuppoſed, that the magnetic poles were at firſt diametrically oppoſite to each other. But if this was the caſe at firſt, we are led to conclude from Mr. Canton's doctrine, that they would not long have continued ſo; for, on account of the intenſe heat of the ſun in the torrid zone, according to the principles ſtated under the article DECLINATION, the north pole muſt ſoon have retired to the north-eaſtward, and the ſouth pole to the ſouth-eaſtward. (Phil. Tranſ. vol. xliv. p. 665, &c.) Mr Michell rejects the notion of a ſubtle fluid; but though he propoſed to publiſh a theory of magnetiſm eſtabliſhed by experiments, no ſuch theory has appeared. Signior Beccaria, from obſerving that a ſudden ſtroke of lightning gives polarity to magnets, conjectures, that a regular and conſtant circulation of the whole maſs of the electric fluid from north to ſouth may be the original cauſe of magnetiſm in general. This current he would not ſuppoſe to ariſe from one ſource, but from ſeveral, in the northern hemiſphere of the earth: the aberration of the common centre of all the currents from the north point, may be the cauſe of the variation of the needle, the period of this declination of the centre of the currents may be the period of the variation, and the obliquity with which the currents ſtrike into the earth may be the cauſe of the dipping of the needle, and alſo why bars of iron more eaſily receive the magnetic virtue in one particular direction. Lettre dell' Elettriciſmo, p. 269, or Prieſtley's Hiſt. Elec. vol. i. p. 409, &c.

Similar to the laſt hypotheſis is that propoſed by the ingenious Æpinus, (Tentamen Theoriæ Electricitatis et Magnetiſmi, cap. i. § 3.) which, though labouring under ſeveral objections, ſeems however to be the moſt plauſible.

From the analogy of the eſtabliſhed or more common hypotheſis of electricity, which goes under the name of Dr. Franklin's, Mr. Æpinus is led to imagine, that there exiſts a fluid productive of all the magnetic phenomena, and conſequently to be called the *magnetic fluid;* that this fluid is ſo very ſubtle as to penetrate the pores of all bodies; and that it is of an elaſtic nature, *viz.* that its particles are repulſive of each other.

He farther ſuppoſes, that there is a mutual attraction between the magnetic fluid and iron, or other ferruginous bodies; but that all other ſubſtances have no action on this fluid; they neither attracting nor repelling each other.

He then obſerves, that there is a great deal of reſemblance between ferruginous bodies and electrics, or non-conductors of electricity; for the magnetic fluid paſſes with difficulty through the pores of the former, as well as the electric fluid paſſes with difficulty through the pores of the latter. However, there is not a body that has any action on the magnetic fluid, and is, at the ſame time, analogous to non-electrics; for inſtance, there is no body, the particles of which attract the magnetic fluid; and yet this fluid can pervade its pores without any obſtruction. In iron, indeed, a kind of gradation of this ſort ſeems to take place; for, the ſofter the iron is, the more freely does the magnetic fluid pervade its pores; and, on the contrary, the harder it is, the greater oppoſition it offers to the free paſſage of that fluid; ſo that the iron, when ſoft, ſeems to be more analogous to non-electrics than when hard.

According to this hypotheſis, iron, and all ferruginous ſubſtances, contain a quantity of magnetic fluid, which is equably diſperſed through their ſubſtance, when thoſe bodies are not magnetic; in which ſtate they ſhew no attraction nor repulſion againſt each other, becauſe the repulſion between the particles of the magnetic fluid is balanced by the attraction between the matter of thoſe bodies and the ſaid fluid, in which caſe thoſe bodies are ſaid to be in a natural ſtate; but, when in a ferruginous body, the quantity of magnetic fluid belonging to it is driven to one end, then the body becomes magnetic, one extremity of it being now overcharged with magnetic fluid, and the other extremity undercharged. Bodies thus conſtituted, *viz.* rendered magnetic, exert a repulſion between their overcharged extremities, in virtue of the repulſion between the particles of that exceſs of magnetic fluid; which is more than overbalanced by the attraction of their matter. There is an attraction exerted between the overcharged extremity of one magnetic body, and the undercharged extremity of the other, on account of the attraction between that fluid and the matter of the body; but to explain the repulſion, which takes place between their undercharged extremities, we muſt either imagine that the matter of ferruginous bodies, which deprived of its magnetic fluid, muſt be repulſive of its own particles, or that the undercharged extremities appear to repel each other, only becauſe either of them attracts the oppoſite overcharged extremities; both which ſuppoſitions are embarraſſed with difficulties.

A ferruginous body, therefore, is rendered magnetic by having the equable diffuſion of magnetic fluid throughout its ſubſtance diſturbed, ſo as to have an overplus of it in one or more parts, and a deficiency of it in one or more other parts; and it remains magnetic as long as its impermeability prevents the reſtoration of the balance between the overcharged and undercharged parts. Moreover, the piece of iron is rendered magnetic by the vicinity of a magnet; becauſe, when the overcharged part or pole of the magnet is preſented to it, the overplus of magnetic fluid in that pole repels the magnetic fluid away from the neareſt extremity of the iron, which, therefore, becomes undercharged, or poſſeſſed of the contrary polarity, to the moſt remote part of the iron, which conſequently becomes overcharged, or poſſeſſed of the ſame polarity as the preſented pole of the magnet. When the piece of iron is rendered magnetic by preſenting to it the undercharged extremity or pole of the magnet, then the part of the iron which is neareſt to it, becomes overcharged, &c. becauſe that part of the magnet, being deprived of its magnetic fluid, attracts the magnetic fluid of the iron to that extremity of the iron which lies neareſt to itſelf.

In conſequence of which it appears, that, in order to give magnetiſm to a body, as a piece of ſteel, the ſtrength of the magnet employed muſt be ſuch as to overcome the reſiſtance, which the ſubſtance of the ſteel makes againſt the free paſſage of the magnetic fluid; hence, a piece of ſoft ſteel is rendered magnetic more eaſily than a hard one; hence, a ſtronger magnet will render magnetic ſuch ferruginous bodies, as other ſmaller magnets have no power upon.

The action of two magnets upon each other is likewiſe eaſily explained by this hypotheſis. When two equal magnets

nets oppofe their contrary poles to each other, they thereby preferve and ftrengthen their power; but when the homologous poles of two magnets are placed near, then, if the ftrength and quality of thofe magnets be equal, they will only diminifh each other's magnetic power; but, if they be unequal in power or other quality, as the hardnefs, fhape, &c. then the weakeft will have its power diminifhed, deftroyed, or changed, in proportion to its foftnefs, weaknefs of magnetifm, and other circumftances, which will eafily occur to the intelligent reader.

Our venerable countryman, Mr. Cavendifh, had invented a fimilar theory, and had entered in many refpects more minutely into the detail of its confequences without being acquainted with the abovecited work of Æpinus; although the publication of his paper on the fubject was 12 years later. Lambert, Meyer, Coulomb, and Robifon have alfo purfued inquiries of a fimilar nature, both theoretically and experimentally, with great fuccefs. See Young's Philofophy, vol. i. lect. 55.

Magnetism, *Laws of*. See Magnet, *fupra*.

Magnetism *and Electricity*, *Analogy between*. The well-known property of amber, by which, after being rubbed, it attracts fmall bodies, was, in an early period of the fcience of electricity, defcribed under the appellation of the magnetifm of amber; fo that thefe two powers, the electrical and the magnetic, were confidered as the fame, or at leaft not fufficiently diftinguifhed. At a later period thefe two powers have been regarded as quite diftinct from each other, but in feveral refpects exhibiting a mutual refemblance. We fhall, therefore, here ftate fome particulars in which they refemble one another, and others in which they differ. The power denominated by philofophers *electricity* (fee that article) is of two forts, *viz.* the *pofitive*, and the *negative* electricity. In the fcience of electricity, it is an invariable law, that bodies poffeffed of the fame fort of electricity repel each other, whereas thofe which are poffeffed of different electricities attract each other.

Thus, in magnetics, there is a north and a fouth pole; thofe parts of magnetic bodies which are poffeffed of the fame polarity, repel each other; but thofe which are poffeffed of different polarities attract each other.

In electricity, whenever a body in a natural ftate is brought within the fphere of action of an electrified body, it becomes itfelf electrified, and poffeffed of the contrary electricity, after which an attraction takes place; fo that in truth there is no electric attraction but between bodies poffeffed of different electricities: for inftance, if a piece of paper be brought fufficiently near a glafs tube, electrified pofitively, the paper will acquire the negative electricity, and will then be attracted by the tube; but if the paper be fo circumftanced as not to have it in its power to acquire the negative electricity, then no attraction will take place.

Thus, a ferruginous fubftance, which is brought within the fphere of action of a magnet, cannot be attracted by either pole of the magnet, unlefs it acquires firft a contrary polarity.

One fort of electricity cannot be produced by itfelf, but is always accompanied by the other; thus, if a glafs tube be electrified pofitively on its external furface, a negative electricity muft exift, either on its internal furface, or on the air contiguous to the tube.

In the fame manner, the two magnetic poles are always together; nor was there a piece of ferruginous fubftance ever produced, which had one polarity, and not the other.

The electric virtue can be retained and confined by certain bodies, like glafs, amber, refins, and others, called *electrics*; but it eafily pervades other fubftances, called *conductors*, or *non-electrics*.

The magnetic virtue is retained by ferruginous fubftances, efpecially thofe of a hard nature, like hard fteel, and the magnet: but it pervades eafily, and without the leaft perceivable impediment, all other forts of fubftances.

On the other hand, the magnetic power differs fom the electric, firft, in its not affecting our fenfes with any light, fmell, tafte, or noife; whereas, the electric fpark, fhock, fmell, and tafte, are known to every one converfant in electric experiments. Secondly, magnetifm attracts only iron, or thofe bodies which contain that metal in fome ftate or other; whereas, the electric power attracts bodies of every fort. Thirdly, the electric virtue refides on the furface of electrified bodies, whereas the magnetic is quite internal. Laftly, a magnet lofes nothing of its power by magnetifing other fubftances; but an electrified body lofes part of its electricity by electrifying other fubftances. Here, however, muft be remarked, that an electrified body lofes part of its power, when in electrifying another body touches it, and that body acquires then the fame fort of electricity; but when that other body is electrified by being only brought within the fphere of action of the former, in which cafe it acquires the contrary electricity, then the former body lofes nothing of its power; for inftance, fuppofe that a body, A, poffeffes a certain quantity of pofitive electricity, and that another body B, in a natural ftate, be gradually brought near A; then the body B, when it comes within a certain diftance of the electrified body A, acquires a negative electricity, which negative electricity takes away nothing of the power of the body A; but if the two bodies come very near, fo as to touch, or as that the electricity of the body, A, may leap from it to the other, then the body, B, will become electrified pofitively, and A lofes thereby part of its power. Indeed, if it be duly confidered, this laft cafe does not feem ever to take place with magnetifm; for bodies appear to be rendered magnetic merely by the action of their fpheres of activity, or by that power which enables magnets to act at fome diftance from their own bodies; and therefore we may juftly fay, that electrified and magnetic bodies agree in this, *viz.* that they lofe nothing of their power, when other bodies are electrified or rendered magnetic in virtue of their fpheres of activity.

When the *aurora borealis*, which has been thought to be an electrical phenomenon, forms a luminous arch towards the northern part of the horizon, the moft elevated part, or middle of that arch, is generally in the magnetic meridian.

Several other points of analogy, or of difference between magnetifm and electricity, will, perhaps, occur to thofe perfons who examine both fubjects; but if they be attentively confidered, we think they will be found to be comprehended in thofe which have been enumerated above. Cavallo's Magnetifm, and Prieftley's Electricity, *ubi fupra*.

Magnetism, *Animal*, an appellation given by fome defigning or felf-deceived operators upon the credulity and purfes of mankind, to certain practices, by which, under the pretence of curing difeafes, various effects were produced on the animal economy, fuch as faintings, partial and even general convulfions &c. Thefe practices were principally carried on in France, by a perfon of the name of Mefmer, and his difciples, and were believed to influence the human body through the medium of the magnetic principle. In confequence, however, of the appointment of a committee of philofophers for the inveftigation of the matter by the French king, the true nature of the operation was proved, in the moft unequivocal manner, and the effects of it traced, by by the cleareſt experiments, ſolely to the mind or *imagination* of the perſons *magnetiſed*. An ample detail of this able inveſtigation, as well as of ſeveral other facts and practices referrible to the ſame ſource, will be found under the article IMAGINATION.

MAGNETISM is alſo uſed, by ſome *Chemiſts*, to ſignify a certain virtue, whereby one thing becomes affected at the ſame time with another, either in the ſame or in a different manner. This amounts to the ſame with what they otherwiſe call *ſympathy*.

It has been obſerved, that much confuſion in the ſcience of magnetiſm has been occaſioned by the application of the term *magnetiſm* to other things which had no relation to it. Thus, the chemical affinity between metals has been called the magnetiſm of metals by ſome old authors. The vibration occaſioned by the ſound of muſical ſtrings or pipes upon others which were tuned in concord with them has been alſo called the magnetiſm of muſic. Some writers alſo ſpeak of the magnetiſm of aſtronomy, the magnetiſm of water, &c.

MAGNICOURT, in *Geography*, a town of France, in the department of the ſtraits of Calais, and chief place of a canton, in the diſtrict of St. Pol; two leagues S.E. of St. Pol.

MAGNIFYING, among *Philoſophers*, is chiefly uſed in ſpeaking of microſcopes, which are ſaid to magnify objects, that is, to make them appear bigger than they really are, though in reality they do not, nor can, magnify any object, but only ſhew it nearer, and diſcover more of its parts than before were taken notice of.

The magnifying power of denſe mediums of certain figures was known to the ancients, though they were far from underſtanding the cauſe of this effect. Seneca ſays, that ſmall and obſcure letters appear larger and brighter through a glaſs globe filled with water; and he abſurdly accounts for it by ſaying, that the eye ſlides in the water, and cannot lay hold of its object. Nat. Queſt. lib. i. c. 6.

Alexander Aphrodiſienſis, the great commentator upon Ariſtotle, who flouriſhed near two centuries after Seneca, ſays, that the reaſon why apples appear large when they are immerſed in water is, that the water which is contiguous to any body is affected with the ſame quality and colour; ſo that the eye is deceived in imagining the body itſelf to be larger. But the firſt diſtinct account we have of the magnifying power of glaſſes is in the writings of Alhazen, who flouriſhed in the twelfth century; and he was preceded by our countryman Roger Bacon, who, in his Opus Majus, demonſtrates, that if a tranſparent body, interpoſed between the eye and an object, be convex towards the eye, the object will appear magnified; nor is it improbable, that from the obſervations of Alhazen and Bacon the conſtruction of ſpectacles was derived. See SPECTACLES.

MAGNIFYING *Glaſs*, in *Optics*, denotes a little ſpherical convex lens; which, in tranſmitting the rays of light, inflects them, ſo as that the parallel ones become converging, and thoſe which were diverging become parallel; by means whereof, objects viewed through them appear larger than when viewed by the naked eye. See MICROSCOPE.

MAGNIN, in *Geography*, a town of Egypt, on the left bank of the Nile; 12 miles S. of Shabur.

MAGNISA, anciently MAGNESIA, a town of Aſiatic Turkey, in the province of Natolia, ſituated near a mountain, whoſe top is always covered with ſnow. The town is large and populous, but has few Chriſtians; 20 leagues N.N.E. of Smyrna. N. lat. 38° 44′. E. long. 27° 18′.

MAGNISI DEGLI, a peninſula of Sicily, on the E. coaſt, in the valley of Noto; ſix miles N. of Siracuſa or Syracuſe; formerly the peninſula of Tapſus. Oppoſite to this peninſula are the ruins of a monument, ſaid to have been erected in memory of the victory of Marcellus.

MAGNISSA, in *Mineralogy*, a name given by ſome of the ancients to the white pyrites, called by others *leucolithos* and *argytholithos*. See MARCASITE.

MAGNITUDE, any thing that has parts without (or *extra* to) parts connected together by ſome common term.

Magnitude is any thing locally extended, or continued; or that has ſeveral dimenſions.

The origin of all magnitude is a point, which, though void of parts itſelf, yet its flux forms a line, the flux of that a ſurface, and of that a body.

Magnitude amounts to much the ſame with what is otherwiſe called *quantity*.

MAGNITUDE, *Geometrical*, may be uſually conſidered as generated or produced by motion. Thus lines may be conceived as generated by the motion of points; ſurfaces, by the motion of lines; ſolids, by the motion of ſurfaces; angles may be ſuppoſed to be generated by the rotation of their ſides.

Geometrical magnitude is always underſtood to conſiſt of parts; and to have no parts, or to have no magnitude, are conſidered as equivalent in this ſcience. There is, however, no neceſſity for conſidering magnitude as made up of an infinite number of ſmall parts; it is ſufficient that no quantity can be ſuppoſed to be ſo ſmall, but it may be conceived to be farther diminiſhed; and it is obvious, that we are not to eſtimate the number of parts that may be conceived in a given magnitude, by thoſe which in particular determinate circumſtances may be actually perceived in it by ſenſe, ſince a greater number of parts become ſenſible, by varying the circumſtances in which it is perceived. See Maclaurin's Fluxions, art. 290, &c.

Many of late have ſuppoſed geometrical magnitude to be compoſed of infinitely ſmall parts, and infinite in number; and hence have raiſed many paradoxes and myſteries in a ſcience in which there ought to be none. Nay, infinitely ſmall parts of infinitely ſmall parts, &c. *ad infinitum*, have been introduced without the leaſt neceſſity. See Maclaurin's Fluxions, in the Introduction, where he makes ſeveral remarks on Monſieur de Fontenelle's Geometrie de l'Infini. See EXTENSION.

MAGNITUDE, *Literal*, denotes a magnitude expreſſed by letters.

MAGNITUDE, *Numerical*, is that expreſſed by numbers.

MAGNITUDE, *Broken*, denotes a fraction.

MAGNITUDE, *Complex*, is that formed by multiplication.

MAGNITUDE, *Incommenſurable*, is that which has no proportion to unity.

MAGNITUDE, *Apparent*, of a body, in *Optics*, is that meaſured by the optic or viſual angle intercepted between rays drawn from its extremes to the centre of the pupil of the eye. It is one of the fundamental maxims in this ſcience, that whatever things are ſeen under the ſame or equal angles, appear equal; and *vice verſâ*.

The apparent magnitudes of an object at different diſtances, are in a ratio leſs than that of their diſtances reciprocally.

The apparent magnitudes of the two great luminaries, the ſun and moon, at riſing and ſetting, are phenomena that have extremely embarraſſed the modern philoſophers. According to the ordinary laws of viſion they ſhould appear the leaſt when neareſt the horizon, as being then fartheſt diſtant from the eye; and yet we find the contrary to be true in fact.

Thus it is well known, that the mean apparent magnitude of of the moon is 30′ 30″, in round numbers 30′, at a full moon in the midſt of winter, and when ſhe is in the meridian, and at her greateſt northern latitude, and conſequently at her utmoſt elevation above our horizon: it is alſo as well known that when ſhe is in this ſituation, being looked upon by the naked eye, ſhe appears to be, accommodating her magnitude to our ſenſible meaſures, about a foot broad. But when ſhe is looked upon as ſhe riſes, ſhe appears to be three or four feet broad. and yet if we take her diameter with an inſtrument, both in the one ſituation and the other, we ſhall find that ſhe is only 30′.

Ptolemy, in his Almageſt, lib. i. cap. 3, has aſcribed this appearance to a refraction of the rays by vapours, which actually enlarge the angle under which the moon appears; juſt as the angle is enlarged by which an object is ſeen placed under water; and his commentator Theon explains diſtinctly how the dilatation of the angle in the object immerſed in water is cauſed. But it was afterwards diſcovered, that there is no alteration in the angle: upon which another ſolution was ſtarted by the Arab Alhazen; and followed and improved by Vitellio, Kepler, Peckham, Roger Bacon, and others. According to Alhazen, the ſight apprehends the ſurface of the heavens as flat, and judges of the ſtars as it would of ordinary viſible objects extended upon a wide plain; the eye ſees them under equal angles, but at the ſame time perceives a difference in their diſtances, and (on account of the ſemidiameter of the earth, which is interpoſed in one caſe and not in the other) it is hence induced to judge thoſe which appear more remote to be greater. Some farther improvement was made in this explanation by Mr. Hobbs, though he fell into ſome miſtakes in his application of geometry to this ſubject. For he obſerves, that this deception operates gradually from the zenith to the horizon; and that if the apparent arch of the ſky be divided into any number of equal parts, thoſe parts, in deſcending towards the horizon, will gradually ſubtend a leſs and leſs angle; and he was the firſt who expreſsly conſidered the vaulted appearance of the ſky as a real portion of a circle. Des Cartes, and from him Dr. Wallis, and moſt other authors, account for the appearance of a different diſtance under the ſame angle, from the long ſeries of objects interpoſed between the eye and the extremity of the ſenſible horizon; which makes us imagine it more remote than when in the meridian, where the eye ſees nothing in the way between the object and itſelf. This idea of a great diſtance makes us imagine the luminary the bigger; for any object being ſeen under any certain angle, and believed at the ſame time very remote, we naturally judge it muſt be very large, to appear under ſuch an angle, at ſuch a diſtance. And thus a pure judgment of the mind makes us ſee the ſun, or moon, bigger in the horizon than in the meridian; notwithſtanding their images painted on the retina are leſs in the former ſituation than the latter.

James Gregory, Geom. Par. Univerſ. p. 141, ſubſcribes to this opinion: Father Malebranche alſo, in the firſt book of his "Récherches de la Verité," printed in 1673, has explained this phenomenon almoſt in the expreſſion of Des Cartes: and Huygens, in his treatiſe on the Parhelia, tranſlated by Dr. Smith, Optics, art. 536, has approved, and very clearly illuſtrated the received opinion. The cauſe of this fallacy, ſays he, in ſhort is this; that we think the ſun or any thing elſe in the heavens to be remoter from us, when it is near the horizon, than when it approaches towards the vertex, becauſe we imagine every thing in the air that appears near the vertex to be no farther from us than the clouds that fly over our heads; whereas, on the other hand, we are uſed to obſerve a large extent of land lying between us and the objects near the horizon, at the farther end of which the convexity of the ſky begins to appear; which, therefore, with the objects that appear in it, is uſually imagined to be much farther from us. Now when two objects of equal magnitudes appear under the ſame angle, we always judge that object to be larger which we think is remoter. And this is the true cauſe of the deception we have been ſpeaking of. It is a wonder that an hypotheſis ſo rational as this ſhould ever loſe its credit, after having been maintained by writers of reputation, and for a great number of years. But it was generally imagined, that the actual perception of thoſe objects which divide the ſpace that is intercepted betwixt the eye and the horizon was neceſſary, in order to its ſuggeſting the idea of its extraordinary diſtance: and thus philoſophers were led to form much more objectionable ſolutions of the phenomenon. Accordingly Gaſſendus was of opinion, that the pupil of the eye, which is always more open as the place is more dark; being more ſo in the morning and evening than at other times, becauſe the earth is covered with groſs vapours; and beſides, being obliged to paſs through a longer column or ſeries of vapours to reach the horizon; the image of the luminary enters the eye at a greater angle, and is really painted there larger at the former times than the latter. In anſwer to which it may be ſaid, that, notwithſtanding this dilatation of the pupil, occaſioned by the obſcurity, if the moon be viewed through a little pin-hole made in a paper, ſhe appears leſs when in the horizon than in the meridian. Nor can any thing be more abſurd than the poſition of Gaſſendus, who aſſerts, that a dilated pupil magnifies an object for the ſame reaſon as a convex glaſs does.

F. Gouye advances another hypotheſis, which is, that when the luminaries are in the horizon, the neighbourhood of the earth, and the groſs vapours wherewith they then appear enveloped, have the ſame effect with regard to us, as a wall, or other denſe body, placed behind a column; which, in that caſe, appears bigger than when inſulate, and encompaſſed on all ſides with an illumined air. Farther, it is obſerved, that a column, when fluted, appears bigger than before, when it was plain; the flutes being ſo many particular objects, which, by their multitude, occaſion the mind to imagine the whole object, whereof they are compoſed, of a larger extent. The ſame thing may be ſaid of the ſeveral objects ſeen towards the horizon, to which the ſun or moon correſpond at their riſing and ſetting. And hence it is, that they appear larger ſtill, when they riſe or ſet between trees; the narrow, yet diſtinct, intervals whereof have the ſame effect with regard to the apparent diameter of the luminary, as a greater number of flutes with regard to the ſhaft of a column.

Biſhop Berkeley ſuppoſed, that the moon appears larger near the horizon, becauſe her appearance is then fainter, and her beams affect the eye leſs; but this hypotheſis is refuted by Dr. Smith. Mr. Robins has recited ſome other opinions on this ſubject, Math. Tracts, vol. ii. p. 242. The commonly received opinion has been diſputed not only by F. Gouye, who obſerves, Acad. Par. 1700, p. 11, that the horizontal moon appears equally large acroſs the ſea, where there are no objects to produce the effect aſcribed to them; but alſo by Mr. Molyneux, who ſays, Phil. Tranſ. abr. vol. i. p. 221, that if this hypotheſis be true, we may at any time increaſe the apparent magnitude of the moon, even in the meridian; for, in order to divide the ſpace between it and the eye, we need only to look at it behind a cluſter of chimnies, the ridge of a hill, or the top of a houſe. He alſo makes the ſame obſervation with F. Gouye, above-mentioned, and farther obſerves,

ſerves. that when the height of all the intermediate objects is cut off, by looking through a tube, the imagination is not helped, the moon being ſtill conceived to be as large as before. However, Mr. Molyneux advances no hypotheſis of his own. Dr. Deſaguliers has well illuſtrated the doctrine of the horizontal moon, Phil. Tranſ. abr. vol. viii. p. 130, upon the ſuppoſition of our imagining the viſible heavens to be only a ſmall portion of a ſpherical ſurface, and conſequently ſuppoſing the moon to be farther from us in the horizon than near the zenith, and by ſeveral ingenious contrivances he demonſtrated how liable we are to ſuch deceptions. But the moſt complete illuſtration of this curious ſubject is given us by Dr. Smith. The cavity of the heavens, he ſays, appears to the eye, which is the only judge of an apparent figure, to be a leſs portion of a ſpherical ſurface than a hemiſphere. In other words, the centre of the concavity is much below the eye, and by taking a medium among ſeveral obſervations, he found that the apparent diſtance of its parts at the horizon was generally between three or four times greater than the apparent diſtance of its parts over head. This he determined by meaſuring the actual height of ſome of the heavenly bodies, when, to his eye, they ſeemed to be half way between the horizon and the zenith. In this caſe their real altitude was only twenty-three degrees. When the ſun was but 30 high, the upper arch always appeared leſs than the under, and he thought that it was always greater when the ſun was about 18 or 20° high. Mr. Robins, in his Tracts, vol. ii. p. 245. ſhews how to determine the apparent concavity of the ſky in a more accurate and geometrical manner; by which it appears, that if the altitude of any of the heavenly bodies be 20 at the time when it ſeems to be half way between the horizon and the zenith, the horizontal diſtance will be hardly leſs than four times the perpendicular diſtance; but if that altitude be 28, it will be little more than two and a half. Dr Smith having determined the apparent figure of the ſky, is able to give a ſatisfactory explanation of the phenomenon of the horizontal moon, and other ſimilar appearances in the heavens. For ſuppoſing the arc A B C, (*Plate* X. *Optics*, *fig.* 4.) to repreſent that apparent concavity, he found that the diameter of the ſun and moon would ſeem to be greater in the horizon than at any propoſed altitude, meaſured by the angle A O B, in the proportion of its apparent diſtances O A, O B. The numbers that expreſs theſe proportions he reduced into the following table, anſwering to the correſponding altitudes of the ſun or moon, which are alſo exactly repreſented to the eye in the figure, in which the figures of the moon, placed in the quadrantal arc F G, deſcribed about the centre O, are all equal to each other, and repreſent the body of the moon in the heights here noted, and the unequal moons in the concavity A B C are terminated by the viſual rays that come from the circumference of the real moon, at thoſe heights, to the eye, at O. The diameters of theſe unequal moons at A and B do, therefore, bear the ſame proportion to each other, as their apparent diſtances O A, O B; and they muſt appear in the ſame proportion that they really have in this concave, becauſe we judge all objects in the heavens to be in this ſurface: ſo that the appearance to the eye is exactly the ſame, as if ſeveral moons were painted upon a real ſurface, A B C, in the proportions here aſſigned; in which caſe we ſhould certainly judge the real magnitudes of the larger paintings of the lower moon to be really larger, though the viſible magnitudes of them all, anſwering to their equal images upon the retina, were exactly equal. For the ſame reaſon Dr. Smith obſerves, that all the objects and diſtances of ſtars in the heavens, as well as the ſun and moon, muſt ſeem to be greater in the horizon than in higher ſituations; which is known to be the caſe. He alſo obſerves, that the apparent concave of the ſky being leſs than an hemiſphere, is the cauſe that the breadths of the colours in the inward and outward rainbows, and the interval between the bows appear leaſt at the top, and greater at the bottom; and by an eſtimate of the apparent breadths of the inward rainbow, at two different heights, made by a friend, he determined the apparent concavity of the ſky to be much the ſame as by the former methods. (See HALO.) This theory of the horizontal moon is alſo confirmed by the appearances of the tails of comets, which, whatever be their real figure, magnitude, and ſituation in abſolute ſpace, do always appear to be an arc of the concave ſky; and in farther confirmation of it, he gives us Mr. Cotes's explanation of the optical appearance of a remarkable meteor ſeen in the year 1716. Beſides the general cauſe above ſtated of the appearance of the horizontal moon, Dr. Smith acknowledges, that, at different times, the moon appears of different magnitudes even in the ſame horizon, and occaſionally of an extraordinary large ſize. This, he is inclined to believe, is chiefly owing to an extraordinary largeneſs of her picture upon the retina, which, in the preceding general theory, was ſuppoſed to be invariable. This, he ſays, might beſt be examined by taking the diameter of the moon with a micrometer, or by noting the year and day of the month, together with the heights of the barometer and thermometer. For if it ſhould appear, by many ſuch obſervations, that the largeſt horizontal moons generally happen at her perigee, in the warmeſt ſummer evenings, the barometer being low, and the thermometer high; ſince theſe cauſes are independent of one another, and all conſpire to enlarge the picture of the moon, we may reaſonably conclude that theſe extraordinary moons are chiefly owing to the concurrence of theſe circumſtances. But ſince the difference in the apparent magnitude of the moon is not increaſed $\frac{1}{16}$th part of the whole in conſequence of her being in her perigee, and the enlargement of the image in all the other caſes here mentioned is very inconſiderable, it is probable that when the moon is imagined to be ſo much larger than uſual, the imagination is farther impoſed upon by ſome circumſtances which have not been attended to. Smith's Optics, vol i. p. 63, &c. Remarks, p. 53.

The ſun or moon's altitude in degrees.	Apparent diameter or diſtances
00	100
15	68
30	50
45	40
60	34
75	31
90	30

MAGNOL, PETER, in *Biography*, a celebrated botaniſt of Montpellier, was born in 1638. He was bred to phyſic, but, being a Proteſtant, could not take his degree there. He was therefore obliged to have recourſe to ſome more ſenſible and more Chriſtian univerſity, where ſuch excluſive laws were unknown. Such are not the reproach of popery only. A few years ago ſome members of the univerſity of Oxford propoſed that one of their honorary degrees ſhould be conferred on Mr. Kirwan of Dublin; a propoſal intended at leaſt as much for their own honour as for his. But this was found to be impracticable, becauſe forſooth that illuſtrious philoſopher and diſtinguiſhed character was a diſſenter! Wherever Magnol graduated, he practiſed phyſic at Montpellier for a long courſe of years, and at the ſame time very aſſiduouſly cultivated Botany, not only as an auxiliary to medicine, but with the moſt enlarged views to its advancement as a ſcience of itſelf. He was beloved for his urbanity, and eſteemed for his knowledge. Numerous botaniſts flocked at this time to Montpellier, that neighbourhood being famous for its vegetable riches; and thefe were all eager to enjoy the fociety, and to benefit by the guidance and inftructions of fo able a man. Hence the herborizations around Montpellier have become celebrated in fo many books; and the fituations of the *hortus Dei* at l'Efperou, the *Mons Ceti*, Caftelnau, wood of Gramont, &c. have become claffic fpots. Among the pupils of Magnol were Fagon and the illuftrious Tournefort, who regularly ftudied under him, and on many fubfequent occafions gratefully acknowledged their obligations to him. He was not chofen public profeffor till long after the years 1679 and 1681, when Tournefort was at Montpellier. He had indeed been one of four perfons, nominated, and recommended to the king for the vacant profefforfhip, in 1667; but his religion was an infuperable obftacle to his appointment, as that of king Solomon himfelf would, in the fame cafe, have been. This difficulty was removed, by his affuming the guife at leaft of Catholicifm, before the year 1694, when he at length obtained the profefforial chair.

In 1676, our author publifhed at Lyons his firft work, the *Botanicum Monfpelienfe*, an octavo volume of 287 pages, with 22 plates. This fame edition was republifhed at Montpellier in 1688, with a new title-page, and 20 pages of appendix. In this book Linnæus reckons that 1366 plants are enumerated; Haller fays 1354; all found wild about Montpellier, and almoft entirely gathered there by the author himfelf. Among thefe, very few of the clafs *Cryptogamia* are included, but fome of them are now acknowledged varieties, and the laft four of the appendix are exotics, inferted merely on account of their novelty. The arrangement of the work is alphabetical. The choice of the names is very felect, and various criticifms or defcriptions are fubjoined, with the particular places of growth and medical virtues of each plant. The plates are rude, but original and characteriftic. This is in fact one of the moft original and authentic works of its kind, being to the Montpellier botanifts what Ray's *Synopfis* is to thofe of Britain, the bafis of all their knowledge. They are neceffarily fuppofed to be able to give an account of every plant which it contains; but their ideas are by no means as yet correct refpecting every one, and an accurate Linnæan *Flora Monfpelienfis* is ftill a defideratum.

In 1689, Magnol publifhed an octavo volume, entitled *Prodromus Hiftoriæ Generalis Plantarum*, in which he undertook a fcheme of natural arrangement. We have not feen this performance. Haller fays the method is that of Ray, deduced from all the parts of a plant; and that the vegetable kingdom is difpofed in 76 families, fubdivided into genera. The author confiders the flowers and fruits as of primary importance, but has recourfe alfo to the roots and habit occafionally. Haller indicates a few miftakes. If they are the worft he could difcover, the work muft rank very high, even at the prefent day.

In 1697 appeared the *Hortus Regius Monfpelienfis*, an 8vo. volume of 209 pages, with 21 elegant plates. This is an alphabetical catalogue of the garden, in which feveral new or rare fpecies are defcribed as well as figured. In their generic diftribution the author conforms to Tournefort principally, and his preface fhews how much he had contemplated this fubject and its difficulties. When we confider that Magnol had had the care of the garden only three years previous to the publication of this rich catalogue, and that he found the collection in a very poor ftate, the book is an honourable monument of his induftry as well as knowledge. The *Garidella*, *Saxifraga hirfuta* and *umbrofa*, *Lathyrus Niffolia*, and fome others, here appear for the firft time.

In 1708, Magnol was admitted a member of the *Academie des Sciences* of Paris, in the place of his diftinguifhed friend Tournefort, who died that year. He continued to profecute his favourite ftudies, having prepared fome obfervations upon the *Pinax* of Cafpar Bauhin, which however he did not live to complete. He communicated to the *Academie des Sciences* fome objections to the opinion of a circulating fap in vegetables, and fome remarks on the importance of their *medulla* or pith. He alfo gave an account of an eafy method of tinging the flowers of the Tuberofe with a folution of fome kind of lake.

Magnol died in 1715, at the age of 77. He left a fon, named Anthony, who was profeffor of phyfic at Montpellier, but not of Botany. To this fon we are indebted for the publication of the *Novus Character Plantarum*, on which the fame of Magnol as a fyftematic botanift chiefly refts. This pofthumous work appeared in 1720, making a quarto volume, of 341 pages. The fyftem therein taught is much celebrated by Linnæus, who in his *Claffes Plantarum*, 375—403, gives a general view of it, expreffing his wonder that fo new and fingular a fyftem had not made more profelytes. It profeffes to be founded on the calyx; but that term is taken in a very wide, and, at this time of day, unauthorized fenfe; for it comprehends the pericarp as well as perianth, the former being denominated the internal calyx, the latter the external. It is neceffary to obferve that Linnæus, in the work above-mentioned, p. 376, fect. 2, α and β, by an erroneous tranfpofition of the words *perianthium* and *pericarpium*, has rendered his account totally unintelligible.—According to this fyftem, every plant is fuppofed to have either an external calyx (enfolding or fuftaining the flower); or an internal one, which is the pericarp; or both. It is more natural than moft early fyftems in its detail, but paradoxical in fome of its primary characters. That fort of fuppofed external calyx, which merely fuftains the flower, is often fcarcely more than the receptacle of Linnæus, the real perianth being either paffed over, or taken for a corolla. The claffes devoted to trees and fhrubs are, as Haller obferves, very imperfect; but we can hardly fubfcribe to his decifion, that the work ought, for the fake of its author, to have been configned to oblivion. It is undoubtedly worthy the confideration of thofe who ftudy natural affinities, and is not the lefs eftimable for being hoftile to the popular methods of its time, founded on the corolla; though that circumftance has probably contributed, more than any thing elfe, to its neglect. The corolla in this method of Magnol affords fubordinate diftinctions only, entering into none of thofe obfcure and evanefcent *minutiæ*, on which fome of the primary characters in the method of Tournefort depend.—Works of Magnol. Hall. Bib. Bot. Dryandr. Bibl. Banks. Dorthes Recherches fur la Vie et les Ouvrages de Belleval. V. Brouffonet Corona Fl. Monfp. S.

MAGNOLIA, in *Botany*, a noble genus of trees or fhrubs, named by Plumier in honour of Peter Magnol, Botanical Profeffor at Montpellier; fee the laft article. Linn. Gen. 278. Schreb. 373. Willd. Sp. Pl. v. 2 1255 Mart. Mill. Dict. v 3. Ait. Hort. Kew. ed. 2. v 3. 329. Juff. 281. Plum. Gen. 38 t. 7. Lamarck Illuftr. t. 490. Gærtn. t. 70.—Clafs and order, *Polyandria Polygynia*. Nat. Ord. *Coadunatæ*, Linn. *Magnoliæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of three ovate, equal, concave, petal like, deciduous leaves. *Cor.* of fix, nine, or more oblong, concave, obtufe petals, narrower at the bafe. *Stam.* Filaments numerous, fhort, incurved, pointed, compreffed and two-edged, inferted into the common receptacle of the piftils below the germens; anthers terminal, linear, of two cells, burfting longitudinally at the inner fide. *Pift.* Germens numerous, ovate-oblong, imbricated upon a cylindrical

drical or ovate receptacle; ſtyles recurved, very ſhort; ſtigmas longitudinal, downy. *Peric.* Capſules numerous, ſeſſile, crowded, coriaceous, compreſſed, wedge-ſhaped, of one cell and two valves burſting outwards, permanent. *Seeds* one or two in each cell, roundiſh-oblong, pulpy, coloured, at length hanging by a thread-like ſtalk, out of the capſule.

Eſſ. Ch. Calyx of three leaves. Petals ſix to twelve. Anthers burſting inwardly. Capſules of two valves, crowded into the form of a cone. Seeds pulpy, pendulous.

Obſ. For the diſtinctions between this genus and *Liriodendrum*, ſee that article.

1. M. *grandiflora.* Laurel-leaved Magnolia. Andr. Repoſ. t. 518. (M. maximo flore, foliis ſubtùs ferrugineis; Trew Ehret. t. 33.)—Leaves perennial, coriaceous, oblong. Petals obovate.—Native of North America, from the northern limits of Carolina to the Miſſiſſippi. *Michaux.* It ſeems by the Hort. Kew. not to have been cultivated in this country before the year 1734. This is a very noble evergreen tree, ſufficiently hardy, at leaſt in the ſouthern parts of England, or near the ſea, only requiring plenty of water to bloſſom freely. The *leaves* are ſcattered, on ſhort thick ſtalks, elliptic-oblong, more or leſs pointed at each end, from four to ten inches long, and two or three broad, veiny, very rigid and coriaceous; ſmooth, ſhining, and of a full bright green, above; opaque, and ſometimes clothed with ruſty down, beneath; their margin entire, thickened and ſomewhat wavy. *Stipulas* ſolitary, convolute, ſheathing, downy, ſoon deciduous. *Flowers* terminal, ſolitary, on thick downy ſtalks, each as large as a pint baſon, white, deliciouſly fragrant like the flavour of cold lemonade. The *petals* have the texture and aſpect of delicate white leather, and ſhrink very much in drying. Theſe *flowers* come out in July. The variety with ruſty leaves bloſſoms at an early age, and is therefore moſt popular; but the great ſmooth-leaved kind, firſt brought to this country, of which fine ſpecimens may be ſeen at Chelſea, Sion houſe, and other old gardens, is vaſtly preferable in itſelf, when it arrives at a ſufficient age to produce its much larger flowers.

2. M. *Plumieri.* Weſt Indian Magnolia. Swartz. Prodr. 87. Fl. Ind. Occ. 997. Plum. Gen. as above. (Talauma; Juſſ. 281.)—Leaves perennial, coriaceous, roundiſh-ovate, ſmooth on both ſides. Flower-ſtalks ſmooth. Petals ten or twelve.—Native of the Weſt Indies, obſerved by Dr. Swartz in St. Lucia, Martinico, and Guadaloupe, where the French call it either *Bois pin*, or *Bois Cachiman.* This author deſcribes it as one of the largeſt of trees, often 80 feet high. "*Branches* round, annulated, ſcarred where the leaves have ſtood, their bark of a greyiſh-brown. *Leaves* alternate, ſtalked, large, roundiſh inclining to ovate, coriaceous, reticulated with veins, ſmooth on both ſides. *Footſtalks* thick, round, flattiſh above, ſmooth and naked. *Flowers* terminal, ſolitary, very large, white and fragrant, on thick ſmooth ſtalks, marked with whitiſh rings. *Calyx* of three large, ovate, concave, coriaceous, petal-like, veiny, deciduous leaves, externally glaucous. *Petals* from 10 to 12, rather longer than the calyx, oblong, obtuſe, concave, thick, contracted at the baſe." Dr. Swartz never met with the fruit. Plumier deſcribes and figures the latter as hard and knobby, of a blue colour, lodging in its ſubſtance ſeveral oblong nuts, each of which contains a kernel of the ſame ſhape. Juſſieu, who found a ſpecimen in Surian's collection, with the name of *Talauma*, deſcribes it as "large and ovate, reſembling a *ſtrobilus* or cone, compoſed externally of thick, granulated, corky, permanent ſcales; while the inner part is woody, hard, hollowed out in its circumference into numerous ſingle-ſeeded cells, apparently not burſting, ſome of them abortive." Theſe are all the materials we have to judge by. Burman's ignorance and miſplaced economy induced him to omit publiſhing a figure of the plant in his *Icones* of Plumier; ſee p. 161 of that book. Swartz ſeems to have had no ſuſpicion that it could be any thing but a *Magnolia*, though his character and deſcription prove it ſpecifically diſtinct from the *grandiflora*; to which however it appears to be ſo very nearly related, that we think it highly improbable there can be any real generic diſtinctions in the ſeed-veſſel. We find nothing in Plumier or Juſſieu, but what may be referred to a not quite ripe, or an ill-underſtood, fruit of a genuine *Magnolia.* If it ſhould prove otherwiſe, we have already (ſee Lobelia) hinted the propriety of not diſturbing the name by which the bulk of the ſpecies are ſo well known, and would rather retain for this, if a ſeparate genus, the appellation it has in Juſſieu, though of barbarous origin. As the point in diſpute is one of the moſt intereſting botanical problems, we wiſh it may excite the attention of ſome Weſt Indian traveller.

3. M. *glauca.* Swamp Magnolia. Linn. Sp. Pl. 755. (M. lauri folio ſubtùs albicante; Trew Ehret. t. 9. Dill. Elth. 207. t. 168.)—Leaves elliptic-oblong, obtuſe, glaucous beneath. Petals obovate.—Native of ſwampy ground in North America. "From New Jerſey to Florida." *Michaux.* It appears to have been the firſt of its genus introduced into the gardens of England, having been cultivated by Biſhop Compton, at Fulham, in 1688. This is a ſmall tree, very deſirable on account of its *flowers*, which come forth, at the ends of the branches, in July, and are cream-coloured, concave, about two inches wide, with a peculiarly rich vinous fragrance, to ſome people rather oppreſſive. The *leaves* alſo are beautiful, about three inches long, varying in breadth, veiny; bright green above; glaucous and ſomewhat ſilky beneath. In the variety ſeen in our gardens they are deciduous; in another, of which we have ſpecimens from Carolina, they are evergreen, and of a longer narrower figure.

4. M. *conſpicua.* Lily-flowered Magnolia, or Youlan. Ait. n. 3. Saliſ. Parad. t. 38. (Mokkwuren 1; Banks Ic. Kæmpf. t. 43.)—Leaves obovate, obtuſe with a point, appearing after the flowers are over.—Preſumed to be a native of China, where it has been cultivated for ages, forming a *tree* 30 or 40 feet high, with zigzag much divided *branches*, at the end of each of which, in the early ſpring, before any leaves appear, ſtands an elegant white lily-like *flower*, four inches wide, with ſome of the cool lemon ſcent of the firſt ſpecies, at leaſt when brought into a warm room. The *leaves* expand in May, and are flexible, on ſlender ſtalks, of a broad obovate or wedge-like figure, with a ſmall tip, each three or four inches, or more, in length. Sir Joſeph Banks procured this fine plant from China in 1789. It is hardy in our climate, and is at an early age covered with flowers from February to April, though the ſevere eaſt winds of the ſeaſon often injure its beauty, unleſs it be protected by a frame, or planted in a conſervatory.

5. M. *obovata.* Purple Magnolia. Thunb. Tr. of Linn. Soc. v. 2. 336. (M. purpurea; Curt. Mag. t. 390. Andr. Repoſ. t. 324. M. diſcolor; Venten. Malmais. t. 24. M. glauca β; Thunb. Jap. 236. Mokkwuren; Kæmpf. Amoen. 845. Banks Ic. Kæmpf. t. 44.)—Leaves obovate, pointed, appearing with the flowers. Petals oblong, bluntiſh.—Native of China, from whence the late duke of Portland is ſaid to have obtained it in 1790. It is tolerably hardy, flowering in May and June, but appears to moſt advantage in a conſervatory. In the ſhape and habit of its *leaves* this agrees much with the laſt, but the *flowers* are larger, of a

fine

fine purple, darkeſt at the outſide, and do not appear till the foliage is fully expanded; they have little or no ſcent. Willdenow and Thunberg erroneouſly conſider Kæmpfer's Ic. t. 43 and 44 as one and the ſame plant, nor has any one corrected their miſtake till now. It is lamentable that Curtis's appropriate name, *purpurea*, has not been preferred to that of Thunberg, whoſe confounding the preſent plant with *M. glauca*, rather ſhakes our confidence in his botanical obſervations and opinions. It muſt be preſumed that his white-flowered variety is our *M. conſpicua*; but in neither of theſe plants are the leaves glaucous beneath. They are in both, eſpecially their ribs and veins, more or leſs clothed with ſhort brown hairs.

6. M. *tomentoſa*. Slender Woolly Magnolia. Thunb. Tr. of Linn. Soc. v. 2. 336. Willd. n. 5. Ait. n. 5. (M. gracilis; Saliſ. Parad. t. 87. Kobus; Kæmpf. Amoen. 845. Ic. t. 42.)—Leaves obovate, pointed, downy beneath, appearing after the flowers. Petals ſix, oblong, obtuſe.—Native of Japan and China, from which laſt country the late Mr. Greville is ſaid to have received a plant, which bloſſomed with him in the ſpring. Mr. Saliſbury aſcertained the ſynonym of Kæmpfer, from his herbarium and papers in the Britiſh Muſeum, and has well aſſerted this to be a diſtinct ſpecies from the laſt.

7. M. *pumila*. Dwarf Magnolia. Ait. n. 6. Andr. Repoſ. t. 226. Sims in Curt. Mag. t. 977. (Gwillimia indica; Rottler MSS. Sampa Saláca, or Milk Flower, of the Malays.)—Leaves elliptic-lanceolate, pointed, ſmooth. Petals ſix, obovate, very blunt, concave. Flower-ſtalk and calyx ſmooth, incurved.—Native of China, or rather, as we ſuſpect, of ſome of the Eaſt Indian iſlands. It is cultivated in China, (from whence the late lady Amelia Hume received a plant about 1786,) as well as at Batavia and Madras, but is never known to produce fruit in any ſituation in which it has come under the examination of botaniſts, ſo that the genus is by no means certain. See what we have already mentioned on this ſubject under LIRIODENDRUM *liliifera*. The preſent is a humble, ſmooth, deciduous *ſhrub*, kept in the greenhouſe, where it blooms at various periods during ſummer. The *foliage* has a glaucous tinge, and is wavy, and finely reticulated with veins. *Flowers* terminal, drooping, globoſe, cream-coloured, ſhort-lived, very fragrant at night, moſt like thoſe of M. *glauca* in ſhape, but ſmaller, and with more of a greeniſh caſt. The cells of the *anthers* are cloſe together, at the inner ſide, and the whole anther is club-ſhaped and obtuſe, very unlike that of the other ſpecies. Mr. Andrews alone has expreſſed theſe moſt important characters.

8. M. *fuſcata*. Brown-ſtalked Magnolia. Andr. Repoſ. t. 229. Sims in Curt. Mag. t. 1008. Ait. n. 7. (M. annonæfolia; Saliſ. Parad. t. 5.)—Leaves elliptic-lanceolate, ſmooth. Petals ſix, elliptical, concave. Flower-ſtalk erect, hairy, as well as the calyx.—Native of China, from whence it was procured by ſir J. Banks, for Kew garden, in 1789. We ſaw and deſcribed the plant about the ſame time in lady A. Hume's collection. It flowers in the greenhouſe from April to July. The *ſtem* is of humble growth, with brown hairy branches. *Leaves* elliptic-lanceolate, ſometimes inclining to obovate, about three inches long, ſmooth, veiny, deciduous except when kept in the ſtove. *Flowers* on lateral or axillary hairy ruſty ſtalks, of a dark dull purple, ſmelling ſtrongly like apples, much ſmaller than thoſe of M. *pumila*. *Anthers* with nearly marginal linear cells, opening inwards, as in true *Magnoliæ*.

9. M. *acuminata*. Blue Magnolia. Linn. Sp. Pl. 756. Ait. n. 8. (M. flore albo, folio majore acuminato, haud albicante; Cateſb. Carol. v. 3. 15; with a plate.)—Leaves ovate-oblong, pointed, downy beneath. Petals more than ſix, channelled, glaucous.—Native of North America from Pennſylvania to Carolina, upon the loftieſt mountains. *Michaux*. Mr. Collinſon firſt introduced it alive into England, in 1736. His original tree was lately in fine perfection at Mill Hill, and we hope ſtill exiſts there, having eſcaped the devaſtation which that intereſting ſpot underwent on its firſt ſale, when ignorance and bad taſte contended which ſhould do the moſt miſchief there. The place is now become a ſchool, and its few remaining treaſures muſt be preſumed to be in great jeopardy. (See COLLINSON, PETER.) The preſent ſpecies forms a large, umbrageous, deciduous *tree*, whoſe wood is yellow. *Leaves* cluſtered at the end of each branch, but on its ſubſequent elongation becoming alternate, ſtalked, pointed at each end, ſeveral inches long, and nearly half as broad; green and ſmooth above; paler, and at firſt downy, beneath. The *flowers* appear among the young leaves early in June, ſtanding ſolitary, each on a ſhort ſmooth ſtalk, at the end of the branches. They are neither fragrant nor beautiful, though remarkable for their pea-green very glaucous *petals*, which vary in ſhape, but are always concave, or channelled, and uſually about two inches long. The *capſule*, with its red *ſeeds*, hanging by long threads out of their cells, is ſometimes ripened in England. We have ſeen it at Kew.

10. M. *tripetala*. Umbrella Magnolia. Linn. Sp. Pl. 756. Ait. n. 10. (M. foliis ovato-oblongis ad baſin et apicem anguſtis, utrinque virentibus; Trew Ehret. t. 62, 63.)—Leaves lanceolate. Petals nine; the three outermoſt reflexed and dependent.—Native of Carolina; more rarely of Virginia. Miller appears to have had this tree at Chelſea in 1752, nor is it now uncommon in curious collections. It loves a moiſt ſtrong ſoil. The *leaves* are deciduous, oblong, ſmooth, light green, tapering at each end, of a very large ſize, uſually 18 inches long at an early period, and finally above two feet, ſpreading in the form of an umbrella at the end of each branch. Among them, early in June, ſtands an upright, very large, white *flower*, remarkable for the three pendulous outer petals, and for its peculiar ſcent, which Munchauſen commends, but moſt people find inſufferable, from its ſtarch-like overwhelming faint ſweetneſs. Ehret compares it to a vaſt quantity of white lilies. The *fruit* is not known to have been ripened here.

11. M. *auriculata*. Ear-leaved Magnolia. Michaux Boreal-Amer. v. 1. 328. Willd. n. 8. Ait. n. 12. Andr. Repoſ. t. 573. Sims in Curt. Mag. t. 1206. (M. Fraſeri; Walt. Carol. 159. t. 1. M auricularis; Saliſ. Parad. t. 43.)—Leaves ſpatulate-ovate, acute; heart-ſhaped at the baſe; ſmooth beneath. Petals obovate.—Native of lofty mountains in Carolina, from whence it was firſt brought to England alive by the late Mr. Fraſer in 1786. This, like the laſt, is a tree that flowers at an early age, and their habits are ſimilar. The prominent rounded lobes at the baſe of the *leaves* mark the preſent ſpecies. The *flowers* appear in July, and are *large*, of a yellowiſh-white, and delightfully fragrant. Willdenow ſeems to have taken from the figure in Mr. Walter's book his character of "claws to the petals," for which there is no juſt foundation, that figure having been faultily drawn, from a dried ſpecimen.

12. M. *macrophylla*. Long-leaved Magnolia. Michaux Boreal-Amer. v. 1. 327. Ait. n. 9.—Leaves ſpatulate-obovate; heart-ſhaped at the baſe; glaucous and downy beneath.—Native of North America, to the weſt of the river Tennaſſée. *Michaux*. Brought by Mr. Fraſer and his ſon, in 1800, "from the wilderneſs in Kentucky, on

the banks of the fouth fork of the Cumberland river."—It flowers in June and July. We have feen but a *leaf*, which has a round, downy, ftriated *footftalk*, full of pith, as Michaux defcribes all the branches to be. The *leaf* itfelf is near 18 inches long, and nine broad, fomewhat panduriform, being contracted above the dilated heart-fhaped bafe, and then again extended: the upper furface is green and fmooth; the under fingularly glaucous, or nearly white, and finely downy; both are minutely reticulated with innumerable veins. Michaux fays the *petals* are fix, white, the lower ones purple at their bafe.

13. M. *cordata*. Heart-leaved Magnolia. Michaux Boreal-Amer. v. 1. 328. Ait. n. 11.—"Leaves heart-fhaped, fomewhat downy beneath."—Native of dry open hills in Georgia and North Carolina. *Michaux*. Meffrs. Frafer are recorded as having brought it to Kew in 1801, but it has not yet bloffomed. Michaux fays it is allied to M. *acuminata*, and that the *flowers* are yellow. We have never feen a fpecimen. S.

MAGNOLIA, in *Gardening*, contains plants of the ever-green and deciduous tree kinds, of which the fpecies ufually cultivated are, the laurel-leaved magnolia (M. grandiflora); the fwamp deciduous magnolia (M. glauca); the blue magnolia (M. acuminata); and the umbrella magnolia, or umbrella tree (M. tripetala.)

The firft fort has varieties with broad leaves, and with narrow leaves.

And in the fecond kind there is a variety with long leaves, which is evergreen.

Method of Culture.—All thefe plants may be increafed by feed, layers, and cuttings of the fhoots.

With regard to the firft mode, the feed, which is received annually early in the fpring from America, preferved in fand, fhould be fown, as foon after as poffible, in pots of light rich earth, half an inch deep, plunging them in a moderate hot-bed, to bring up the plants an inch or two in height, or in the common earth under a warm wall or hedge, or in a frame, in the full fun, till the middle or latter end of April, then replunging them in an eafterly border open to the morning fun; giving moderate fprinklings of water in dry weather. The plants will rife the fame year; thofe in the hot-bed, probably in April, and the others in May, inuring thofe in the firft fituation timely to the full air. The plants fhould, all fummer, be regularly fupplied with water, and at the approach of winter be removed into a greenhoufe, or, rather, under a garden-frame, to be fheltered from froft all winter, indulging them with the open air in mild weather. If the pots be plunged in a bark hot-bed, &c. about March, under a frame, two or three months, it will forward the plants greatly; being careful to give water, and harden them to the open air gradually, fo as to be removed into it in their pots fully in June, to remain till the autumn, when they fhould be allowed fhelter in winter, as before. The following fpring, they fhould be planted into feparate pots, and plunged into a hot-bed, as before, to fet them forward, giving water, occafional fhade, and the benefit of free air; and in June removing the pots to a fhady border for the remainder of the fummer. In winter they fhould have fhelter as before, from fevere froft, but have the full air in all open weather. They require the fame care for two or three winters, when fome of them may be turned out of the pots with balls of earth about their roots, into the full ground, in a warm fheltered fituation, particularly the deciduous kinds; but the firft, or evergreen fort, fhould not be too foon expofed to the winter's cold, but be continued in occafional fhelter in the above manner four or five years, till two, three, or more feet high; and when turned out, matted occafionally in fevere winters, retaining fome in pots to be managed as greenhoufe plants of the more hardy kind.

In the layering mode, the layers fhould be laid down in autumn or fpring, choofing the young pliable fhoots for the purpofe, giving them a gentle twift, or a flit in the part laid into the earth. Some will be well rooted in one year, others probably not in lefs than two; then take them off, and plant each in a pot in the early fpring, plunging them in a moderate hot-bed for a month or two, to promote their growth freely at firft, and they will generally form good ftrong plants by the following autumn, allowing them fhelter in winter for a year or two, when they may be planted out.

In the cutting plan, the cuttings fhould be made from the fhort young fhoots of the preceding year, and be planted in pots of good earth, plunging them to the rims in the common or ftove hot-bed, giving water and occafional fhade; fome of them will be rooted the fame year, when they muft be inured by degrees to the open air, after which they may be managed as the layers.

It may be noticed that the firft, or ever-green fort, is one of the moft beautiful trees in nature, both in its growth, and in the luxuriance of its noble leaves, which render it fingularly confpicuous at all feafons. And the deciduous forts are alfo highly ornamental trees, and may be introduced into clumps and fhrubberies, where, by their fine foliage, they exhibit an elegant variety.

In common, all the different fpecies are cultivated in the nurferies, for fale, from which they may be taken up and planted out in the early fpring or autumn months; but the former is the better in moft cafes.

With regard to their difpofition in the fhrubbery, as they are rather tender in their early growth, they fhould have a fheltered funny fituation, in a rather dry foil, being planted in the moft confpicuous places, and not too clofely crowded with other fhrubs. But they have a good effect even when difpofed fingly in different parts, as in open fpaces of fhort grafs-ground, in fheltered fituations; efpecially the firft fort, from its evergreen nature.

MAGNOLIÆ, in *Botany*, a natural order of plants, fo called from the genus *Magnolia*, which makes a principal figure among them, is the feventy-fifth in the fyftem of Juffieu, and the fifteenth of his thirteenth clafs. See GERANIA.

The *Magnoliæ* are thus characterized. *Calyx* of a definite number of leaves, fometimes bracteated. *Petals* generally of a definite number, truly inferted below the germen. *Stamens* numerous, diftinct, with the fame infertion; anthers coalefcing with the filaments. *Germens* feveral, either definite or indefinite in number, placed on a common receptacle; ftyles either one to each germen, or wanting; ftigmas one to each germen. *Capfules* or *berries* as many as there are germens, of one cell, containing one or many feeds; fometimes the pericarps coalefce into one fingle fruit. *Embryo* of the feed ftraight, deftitute of albumen. *Stem* fhrubby or arborefcent. *Leaves* alternate, moftly undivided, the younger ones fheathed by ftipulas which embrace the branch, being convoluted in the form of a horn, as in the Fig genus, and protecting the bud, which is terminal. Thefe ftipulas, however, foon fall off, leaving a circular fcar. The *flowers* are either terminal or axillary.

The genera referred by Juffieu to this order are *Euryandra* of Forfter, which Schreber makes a *Tetracera*, fee EURYANDRA; *Drymis* of Forfter, the *Wintera* of Schreber; *Illicium*, *Michelia*, and *Magnolia* of Linnæus; *Talauma* of Juffieu, which is the original *Magnolia* of Plumier; *Liriodendrum*

dendrum of Linnæus; and *Mayna* of Aublet, Lam. Illuſtr. t. 491.

To theſe are ſubjoined as akin to them, *Dillenia*, *Curatella*, *Ochna*, and *Quaſſia*.

MAGNON, John, in *Biography*, a French poet and advocate, who exerciſed his profeſſion ſome time at Lyons, and then quitted it for dramatic writing, was born at Tournay. He was aſſaſſinated in 1662, in the ſtreets of Paris. He is mentioned as the perſon who projected, but did not live to complete, an Encyclopédie in verſe. Moreri.

MAGNOTS, or Mainots, in *Geography*, an appellation diſtinguiſhing Greeks, who inhabit the ſouth part of the Môrea, the environs of Sparta, and more particularly the part which extends from Miſitra to Cape Matapan. As remains of the Lacedæmonians, they are as ardent as their anceſtors in defending their liberty and maintaining their independence. The Turks have ſometimes obtained a trifling tribute from them, without ever having been able entirely to ſubdue them. Cultivators or ſhepherds, mariners or pirates, according to the exigence of their circumſtances, they are always ready to quit the ſmall towns which they occupy on the gulfs of Coron and of Colokythia, for the purpoſe of penetrating into the interior of the country, and eſtabliſhing themſelves on the mountains. With this energy and love of liberty, it is to be regretted, that there are among them robbers, who, not content with making war on the Turks, who have unjuſtly diſpoſſeſſed them of a part of their territory, alſo go ſometimes to plunder the unfortunate Greeks of the ſmall iſlands of the Archipelago, who ought rather, on account of identity of religion and of intereſt, to unite againſt their common enemies.

MAGNUM Os, in *Anatomy*, a name of one of the bones of the carpus. See its deſcription in the article Extremities.

MAGNUS, John, in *Biography*, archbiſhop of Upſal, in Sweden, was born in 1488. He oppoſed moſt ſtrenuouſly the Reformation in Sweden, and finding his efforts ineffectual, he retired to Rome, where he died in 1544. He wrote a hiſtory of Sweden, and lives of the archbiſhops of Upſal: he had a brother Olaus, who was one of the perſons at the council of Trent, where he diſplayed conſiderable talents for buſineſs. He died at Rome in 1560. His greateſt work is a Hiſtory of the Northern Nations.

Magnus, organiſt of the church of St. Giles-in-the-Fields, who flouriſhed about the year 1730, was eſteemed, by his contemporaries, a great maſter of harmony, and an admirable extempore player on the organ; of whoſe great abilities many years after his deceaſe we have often heard Rouingrave and Dr. Arne ſpeak with rapture. Before Kelway and Stanley were arrived at great renown, which they afterwards acquired by their voluntary playing, Magnus drew crowds of young organiſts to St. Giles's every Sunday to hear him on the full organ, on which, deſpiſing ſingle ſolo ſtops, he had attained to ſuch command, as to be able to conduct four parts in fugue, with as much correctneſs and facility, as others could two parts, without fugue or imitation. Exceſſive ſtudy and application brought on a diſorder in his intellects, which put an end to his exiſtence, at an early period of his life.

MAGNY, in *Geography*, a town of France, in the department of the Seine and Oiſe, and chief place of a canton, in the diſtrict of Mantes; 12 miles N. of Mantes. The place contains 1402, and the canton 11,149 inhabitants, on a territory of 222½ kiliometres, in 29 communes.

MAGO, a town of the iſland of Ceylon, near the S.E. coaſt; 98 miles S.S.E. of Candy.

MAGOAR, a town of France, in the department of the North Coaſts; 10 miles S. of Guingamp.

MAGODUS, among the Romans, a name given to thoſe players who ſometimes acted the part of men, and ſometimes of women: the word is derived from μαγος, *magic*, and ᾠδὸς, *ſinger*, and properly denotes thoſe players who performed extraordinary feats and geſtures.

MAGOLSHEIM, in *Geography*, a town of Germany, in the kingdom of Wurtemberg; 30 miles S. of Stuttgart.

MAGON, a town of the iſland of Minorca, ſaid to have been founded by the Carthaginians.

MAGONA, in *Ornithology*, the name given by Buffon to the Macaragua of Maregrave, Ray, &c. and the great Tinamou of Latham. See Tetrao *Major*.

MAGOPHONIA, formed from μαγος, *magus*, and φονος, *ſlaughter*, the name of a feaſt among the ancient Perſians, held in memory of the expulſion of the Magians.

The Magus Smerdis having uſurped the throne of Perſia, upon the death of Cambyſes, 521 years before Jeſus Chriſt, ſeven of the principal lords of the court conſpired to drive him out of it. Their deſign was executed with good ſucceſs: Smerdis, and his brother, another Magus, called Patizithes, were killed. Upon which the people alſo roſe, and put all the Magi to the ſword; inſomuch that there would not have one eſcaped, had not night come upon them. Darius, ſon of Hyſtaſpes, was then elected king: and, in memory of this maſſacre of the Magi, a feaſt was inſtituted, ſays Herodotus, called *Magophonia*. See Magi.

MAGORA, in *Geography*, a town of Walachia; 14 miles S.E. of Ruſei.—Alſo, a ſea-port of Arabia, in the Red ſea; 150 miles N.N.W. of Loheia. N. lat. 17° 40′.

MAGOT, in *Zoology*, the name given by Buffon to the Barbary ape of Pennant, or the Simia *Inuus*; which ſee.

MAGOTTY Cove, in *Geography*, a bay on the N. coaſt of Jamaica; one mile W. of Muſketto cove.

MAGPIE River, a river of Canada, which runs into the gulf of St. Lawrence, about ſix miles W. from the mouth of the river St. John.

MAGPYE, in *Ornithology*, a well-known ſpecies of the *Corvus*, or the *corvus pica*, in the Linnæan ſyſtem: it is a crafty, reſtleſs, noiſy bird, called by Ovid *nemorum convicia pica*. See Corvus *Pica*.

MAGRA, in *Geography*, barren mountains of Africa, on the road from Tripoli to Egypt; 150 miles W. of Cairo.

Magra, or *Magora*, a river of Italy, which riſes in the Apennines, and paſſing through a valley, called the "valley of Magra," runs into the ſea, five miles S. of Sarzana.

MAGRACOTTA, a town of Hindooſtan, five miles W. of Palicandcherry.

MAGRE, a town of Hindooſtan, in the Myſore country, deemed by the Hindoos a place of peculiar ſanctity, and abounding in pagodas and choultries; ſix miles from Savindroog.

MAGREBIANS. See Mograbians.

MAGUA, a town of Hindooſtan, in Dowlatabad; five miles S. of Beder.

MAGUALBARI, or Rio das Galines, a river of Africa, in Guinea, which runs into the Atlantic, N. lat. 7°.

MAGUANA, St. John *of*, a canton and town on the S. ſide of the iſland of St. Domingo, on the left ſide of the river Neybe. The capital of the ancient kingdom of Maguana ſtood where the town St. John of Maguana is now ſituated. This canton was pillaged by the Engliſh privateers in 1543. In 1764, the diſtrict of the new pariſh contained 3600 perſons, of whom 300 were capable of bearing arms. Its population now amounts to more than 5000 perfons.

Maguana. See Mayaguana.

MAGUARI, in *Ornithology*. See Ciconia *Americana*.

MAGUDARIS, a name by which Diofcorides calls the filphium.

MAGUELONE, in *Geography*, a lake of France, in the department of the Gard, near the Mediterranean, communicating with it, and extending from Catte to Pecais. Its name is derived from that of an ancient town, which was a bifhop's fee, transferred in 1538 to Montpellier. Charles Martel deftroyed the town, becaufe it was an afylum for Saracen invaders. It was rebuilt in the year 1060, but is now a fmall place, fituated on a neck of land between the lake and the fea; five miles S. of Montpellier. N. lat. 43° 30'. E. long. 3° 58'.

MAGUIBA, a river of Africa, that runs into the fea, E. of cape Monte.

MAGULLACONDA, a town of Hindooftan, in Myfore; 30 miles from Chinna Balabaram.

MAGUMBA, a province of Africa, in the N.W. part of the kingdom of Loango.

MAGYDARIS, in *Botany*, a name ufed by Theophraftus, and other of the old authors, for the laferpitium or laferwort.

MA-HA, or Ma-coupa, in *Geography*, a city of China, of the fecond rank, in Koei-tcheou. N. lat. 26° 26'. E. long. 107°.

MAHABARAT, an epic poem in the Sanfkrita language, by an author very celebrated among all fects of Hindoos, named Vyafa, to whom alfo is afcribed the facred romances, the Puranas. (See Vyasa and Purana.) The fubject of the Mahabarat is the heroic adventures of the five fons of Pandu, called hence the Pandavas. (See Pandu.) It is a work of great extent, amounting it is faid to upwards of a hundred thoufand metrical ftanzas, of which more than a third have been tranflated by Dr. Wilkins, librarian to the Eaft India company. This learned gentleman publifhed in 1785, an epifode of the great poem, under the title of "Bhagavat Gita, or Dialogues of Krifhna and Arjun." An extract from that very curious work is given under the article Krishna. The Mahabarat contains the genealogy and general hiftory of the houfe of Bhaurat, fo named from Bharat its founder, the epithet Maha, or *great*, being prefixed in token of diftinction; but its more particular object is to relate the diffentions and wars of the two great collateral branches of it, called from their anceftors the Kurus and Pandus (fee Kuru), both lineally defcended in the fecond degree from Vichitravirya, their common anceftor, by their refpective fathers Dritrarafhtra and Pandu. In the dedication of the Bhagavat Gita, Mr. Warren Haftings, under whofe aufpices the tranflation was made, after noticing the banifhment of the Pandus, fays, "The exiles, after a feries of adventures, worked up with a wonderful fertility of genius and pomp of language into a thoufand fublime defcriptions, returned with a powerful army to avenge their wrongs, and to affert their pretenfions to the empire in right of their father. In this ftate the epifode opens." Without allowing the antiquity of four or five thoufand years as claimed by the Hindoo literati for their juftly admired Mahabarat, its great age is unqueftionable. In general eftimation it ranks next to the Ramayana, if it be not fuperior to it, in reputation for holinefs: the Vedas and Puranas only precede thefe works in the eftimation of a great portion of the Hindoos. See Ramayana.

Mr. Moor, in his Hindoo Pantheon, after noticing the allegorical character of Oriental mythology, fays, "This may ferve as a farther fpecimen of the endlefs allegories in which the poetical fabulifts have veiled the moral, fcientific, and theological knowledge of the Hindoos; all of which, as well as hiftory, and even arts, if not buried in, are obfcured by, and intimately connected with, their wild and bold mythology. Thus, again, the Mahabarat is a continued allegory of the conflicts between man's virtues and his vices: the former perfonified under the names of the five fons of Pandu; of whom Bhima, Yudifhtira, and Arjun, faid to reprefent Juftice, Fortitude, and Prudence, were by one mother, Koonti; and the other two, Nakal and Sahadeva, perfonifications of Temperance and Wifdom, were by Maderi. (See Koonti and Maderi.) Other legends attribute the virtues of Modefty and Tendernefs to Yudifhtira; Strength to Bhima; and Skill or Courage to Arjun; to Nakal, Beauty or Harmony; and to Sahadeva, Wifdom and Penetration. The two laft brothers are by fome faid to be the twin virtues of Temperance and Chaftity. Man's manifold vices are perfonated by the hundred fons of Kuru, the brother of Pandu: hence a near relationfhip exifts between Vice and Virtue." P. 92.

MAHABELI, a name in Hindoo mythological legends of a monarch who, although reafonably virtuous on other points, was ftill fo elated by his grandeur, that he omitted the effential ceremonies and offerings to the deities; and Vifhnu found it neceffary to check the influence of fuch an example, by refolving to become, for that purpofe, incarnated in the perfon of a wretched Brahman dwarf. This incarnation, or avatara, is one of the ten principal defcents of Vifhnu, and is called Vamana, or the dwarf. (See Vamana and Vishnu.) Sir William Jones furmifes the Belus of weftern hiftory, to be the fame with the Beli of this article, for the epithet of Maha prefixed, merely means *great* in the Sanfkrita language.

MAHABUTPOUR, in *Geography*, a town of Bengal; 33 miles S. of Dacca.

MAHACKAMACK, a river of America, which falls into the Delaware from the N.E. at the N.W. corner of New Jerfey.

MAHACONDAPALLY, a town of Hindooftan, in Myfore; 15 miles S. of Ouffoor.

MAHADEO, a temple of Thibet, fituated on the lake Manfaroar.

MAHA-DEVA, in *Hindoo Mythology*, is a name given to the god Siva, one of the perfons in their divine triad. (See Siva.) In Sanfkrit it means literally the great god; and although we might expect to find this name thus applied by the fect only, who exclufively worfhip Siva, indicating the pre-eminence of their deity, yet it is faid to be commonly given to him by other fects, as well as by his own.

MAHAKALA, a name of Siva, the deftructive attribute of the deity. The name feems to be the fame as Kal or Kala (which fee), with an epithet prefixed, meaning *great*. Mr. Paterfon, in the eighth volume of the Afiatic Refearches, thus defcribes this perfonification. "Mahal Kal, as reprefented in the caverns of Elephanta, had eight arms. In one he holds a human figure, in another a fword, or facrificial axe; in a third he holds a bafin of blood, and with a fourth he rings over it the facrificial bell. Two other arms are broken off; with the two remaining he is drawing behind him a veil, which extinguifhes the fun, and involves the whole univerfe in one undiftinguifhed ruin. One of the titles of this tremendous deity is Bhairava, the Terrific; but his principal

principal defignation is Kal-Agni-Rudra." Thefe three words, we are told in the Hindoo Pantheon, are efpecially defcriptive of Siva, and may be rendered Time, Fire, Fate. See KAL.

Niebuhr gives a print in his Indian Travels of the fculpture above defcribed, which Maurice has copied into his fixth volume of Indian Antiquities. In the Hindoo Pantheon, the following defcription is given of this fubject from the perfonal examination of the author. "Having lately been in the Elephanta cavern, and when there made fome memoranda, I will thence extract what relates to the fubject of Mahakala.—The compartment containing the group, of which Siva in this character makes the principal figure, is on the right of the entrance, facing a compartment of like fize, containing what, in another part of this work, I have fuppofed to be a marriage ceremony. The figure is of Siva *Vindex*, fourteen feet high, but the lower extremities broken off; his attention is from his attitude turned to his left, his afpect is terrific, indicating the immediate execution of fome avenging act,—he had eight arms; the fuperior right and left ftretched upwards, and either fupporting a cloth or curtain, or putting it over the terrible event he threatens—the fingers grafp the cloth. The left upftretched arm is finely executed; the right is broken at the elbow: the next right hand is broken off at the wrift; the correfponding left holds a bell, in good prefervation, over a cup in the palm of the next, having a ferpent twining near the elbow. A third right hand grafps a long ftraight fword, uplifted, perfect; the two inferior hands, right and left, are broken off above the elbow: they were in bolder relief, and the left appears to have fupported, or to have grafped, the leg of a kneeling figure, the trunk only of which remains; its legs, arms, and head being broken off. This kneeling figure may have been between five and fix feet in height; its back is toward the threatener, and leaning fo in his direction, as to drop its blood, if fpilled, into the cup before noticed. The head of the principal figure has a highly ornamented cap; a fcull and ferpent are among its frontal ornaments. It has alfo a pendent necklace, and a chaplet, if it may be fo called, of human heads, of which only two or three are plainly difcernible, flowing over the left fhoulder to the right thigh, where it is broken off: the Zennar, or holy thread (fee ZENNAR), and a broader belt, run in nearly a like direction. On all the wrifts are bracelets, and above the elbows of three of the arms is the ornament called bazuband. No figures remain in any prefervation to the right of the principal, or under him. On the left, near the fuppofed victim, are two bearded faces, expreffive of Pity; a compaffionate female is juft above them, leaning forward over the victim; fhe holds her fcarf in her hands, and is an elegant perfon: below the bearded men are two or three females with pitying afpects: the fame emotion, intermingled with terror, is evident in every face of this compartment, where features can be traced.

"Over the fubjects juft defcribed, is a row of males and females of rather diminutive fize; in the middle of the row, nearly over the head of Siva, is a thing like a mitre, with a crofier cut deep in it, and furmounted with a crofs; but the limbs of the crofs not exactly at right angles; two aged and emaciated figures are on the right (the fpectator's right) of the mitre, holding up their hands betokening pity and pain: on the other fide of the mitre are two fimilar figures; in front of each pair is a proftrate diftreffed male child, their heads near the mitre: beyond the laft mentioned pair, on the fpectator's left, are a male and female in great anxiety and diftrefs, holding fcarfs in their hands.

"The fubject, fuppofed to refemble a mitre, crofier, and crofs, appears alfo in another compartment of this cavern. Fancy may, perhaps, have had fome fhare in making this refemblance; but it is really curious, and I think ftriking, although, I believe, heretofore not remarked." Hin. Pan. p. 51.

The great antiquity of the cavern wherein is this curious piece of fculpture is unqueftionable, although no period approaching to exactnefs can be affigned for its origin. The Hindoos, and their Brahmans, with their accuftomed pronenefs to hyperbole, throw it back into very remote ages; and fome of our miffionaries and other European travellers, as if unwilling to be outdone in extravagance, have imagined the figure here defcribed of Mahakala deftroying a human being, typical perhaps of Time and the human race, to be a reprefentation of the judgment of Solomon! Without ftopping here to difcufs fuch ill-judged fpeculations, fimilar inftances of which will be found under our article KRISHNA; it may be fufficient to notice the progrefs that the art of fculpture had made in India in times certainly very remote in reference to art and fcience. The compartment defcribed in the preceding extracts is elaborate in figures powerfully expreffing one emotion of the mind; a precifion ftrongly indicating great refinement and fkill. It may be reafonably queftioned if any fpecimen equal in age and execution can be elfewhere pointed out. Of the cavern temples of India, fome account is given under the articles ELEPHANTA, ELORA, and KARLY.

MAHAKALI, a name of *Parvati*, the confort of *Siva*, in his character of *Mahakala*; under which articles, and *Kal* and *Kali*, farther information may be fought.

MAHA-LAKSHMI, a name given by certain fects of Hindoos to *Lakfhmi*, the confort of *Vifhnu*. See thofe articles. Under this name fhe is worfhipped at a pretty temple on the weftern fea-fhore of the ifland of Bombay, which is much reforted to at the annual jatra, or fair.

MAHALEB, in the *Materia Medica*, the name of the fruit of a fort of wild cherry, called *cerafus fylveftris amara*, or the wild bitter cherry, by Bauhin. The wood of the tree is of a greyifh caft, and fine grain, with a mixture of red in the veins, and is very firm, and of a fweet fmell, and ufed by the French in making cabinets; the leaves and flower carry a rude refemblance of thofe of the common cherry; the fruit is round, black, and refembles a cherry, having the fame fort of ftone in it, the kernel of which is like the bitter almond in tafte. It is commended in external applications, and the perfumers of France ufe it in their wafhballs. It is to be chofen frefh and fweet, for it very often has an intolerable ftinking fmell, like that of bugs. See PRUNUS.

MAHALOULE CASSIR, in *Geography*, a town of Africa, in the kingdom of Tunis; 9 miles E. of Zunghar.

MAHAMAIL, a town of Algiers; 27 miles W.S.W. of Tipfa.

MAHAMMA, a town of Arabia, in the province of Yemen; 24 miles S.E. of Chamir.

MAHAMUNDALA, a town of Hindooftan, in the Carnatic; 10 miles S. of Chittoor.

MAHAN, a town of Perfia, in the province of Kerman; 60 miles N.E. of Sirgian.

MAHANADA, or MAHA-NUDDY, a river of Hindooftan, which rifes in the mountains of Berar, in the country of Ruttunpour, traverfes the country of Oriffa, paffes by Cattack, where it is fometimes called the Cattack river, and difcharges itfelf by feveral mouths into the bay of Bengal; 40 miles E.S.E. of Cattack. The fartheft point to which it is navigable from the fea is Arung. Near this river is the fort called *Boad*, and a town called *Beiragur*, which fee

fee refpectively. The mouths of the river, which form an affemblage of low woody iflands, like the Ganges, and many other rivers, have never been traced, but are defcribed merely from report. At the mouth of the principal channel, near Falfe point, is a fortified ifland, named Cojung, or Codjung. Ptolemy's *Adamas* river anfwers perfectly to the Mahanuddy; and the diftrict "Sabaræ," on its banks, is faid to abound in diamonds.

MAHANÆDA, a river of Hindooftan, which rifes on the borders of Bootan, and runs into the Ganges; 20 miles N. of Moorfhedabad.

MAHANAGORE, a town of Bengal; 20 miles N. of Iflamabad.

MAHANAIM, or MANAIM, in *Ancient Geography*, a city of Paleftine, belonging to the Levites, of the family of Merari, in the tribe of Gad, on the brook Jabok. (Jofh. xxi. 38, xiii. 29, 30. 1 Chron. vi. 80.) Jacob gave it this name, becaufe he had here a vifion of angels. (Gen. xxxii. 2.) In the Vulgate it is fometimes called fimply "Caftra," or the camp. Gen. xxxii. 2. 2 Sam. ii. 8. 12. 29. xvii. 24. xix. 32.

MAHANASAN, in *Geography*, a city of Perfia, in the province of Mazanderan, compofed of three towns joined together. In 1392 it was taken, pillaged, and deftroyed by Timur Bec; 12 miles N.E. of Amol.

MAHANDPOUR, a town of Hindooftan, in the circar of Chanderee; 38 miles W. of Chanderee.

MAHANGANO, a province of Africa, in the kingdom of Angola, having a capital of the fame name.

MAHANY, a river of Hindooftan, in Bahar, which runs into the Ganges, about 25 miles below Bar.

MAHAPRALAYA, in *Metaphyfics*, is confidered among Hindoo philofophers as the grand confummation of all things: the great deftruction, as the word appears to mean. See hereon under KAL.

MAHARSHIS, an appellation applied in Hindoo books to departed fages or faints. The terms Devarfhi, Rajarfhi, and Maharfhi, feem nearly fynonimous with Rifhi, meaning faint, deified faint, great faint, or great fage. There are differences doubtlefs, for Nareda is reckoned the chief of the Devarfhis. Krifhna in the Bhagavat Gita (fee MAHABARAT) fpeaks of his "holy fervants the Brahmans and the Rajarfhis," and fays "I am Brighu among the Maharfhis, and of all the Devarfhis I am Nared," p. 86. (See NAREDA.) Nareda and Brighu are generally called fons of Brahma. The term Maharfhi occurring in the fixth fection of the firft book of the Ramayan, the learned tranflators fubjoin the following note—"There are four kinds of fages or Rifhis: the Rajarfhi, or royal fage; the Maharfhi, or great fage; the Brahmarfhi, or facred fage; and the Devarfhi, or divine fage: of thefe the firft is efteemed the loweft, and the laft the higheft." Hindoo Pantheon, p. 95. (See RISHI.) The names of thefe fages, and allufions to them, occur frequently in the writings of the Hindoos.

MAHA-RUDRA, in *Hindoo Mythology*, a name of Siva. It means the great Rudra. See SIVA and RUDRA.

MAHAUT BAY, in *Geography*, a bay on the W. coaft of the ifland of St. Vincent, S. of Cumberland bay.

MAHAWA GAUT, a mountain of Bahar; 24 miles W. of Saferam.

MAHBROOK, a town of Africa, in the Sahara; 160 miles W.N.W. of Tombuctoo. N. lat. 19° 10'. E. long. 0 15'.

MAHBUB, in *Commerce*, a Turkifh gold coin. See SEQUIN.

MAHDIA, in *Geography*. See MAADIÉ.

MAHE', a town and fortrefs of Hindooftan, on the coaft of Malabar. Mount Dilla, which is a remarkable promontory, fituated in N. lat. 12° 1'. E. long. 75° 2', or 1° W. of Cochin, appears to be W. 33° 15' N., or nearly N.W. by W. from Mahé, diftant from it 28.4 geographical miles. N. lat. 11° 45' 18". E. long. 75° 26' 30". —Alfo, a fmall ifland in the Indian fea. S. lat. 4° 45'. E. long. 55° 30'.

MAHENDRA, a name of the Hindoo deity *Indra*; which fee.

MAHERNIA, in *Botany*, is of uncertain derivation, unlefs, as profeffor Martyn fays, it be fancifully confidered as an anagrammatic inverfion of *Hermannia*: the two genera being very nearly allied, or rather, in reality, fcarcely to be feparated.—Linn. Mant. 8. Schreb. 208. Willd. Sp. Pl. v. 1. 1564. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. ed. 2. v. 2. 198. Juff. 290. Lamarck Illuftr. t. 218.—Clafs and order, *Pentandria Pentagynia*. Nat. Ord. *Columniferæ*, Linn. *Tiliaceæ*, Juff.

Gen. Ch. *Cal.* Perianth of one leaf, bell-fhaped, permanent, cut into five, awl-fhaped, longifh teeth. *Cor.* Petals five, heart-fhaped, oblong, fpreading, twice as long as the calyx. Nectaries five, obcordate, on ftalks, furrounding the germen, fhorter than the calyx. *Stam.* Filaments five, capillary, placed upon the nectaries, fhorter than the calyx; anthers oblong; pointed, erect. *Pift.* Germen on a fhort ftalk, obovate, five-fided; ftyles five, briftle-fhaped, erect, the length of the petals; ftigmas fimple. *Peric.* Capfule ovate, of five cells, and five valves. *Seeds* few, kidney-fhaped.

Eff. Ch. Calyx five-toothed. Petals five. Nectaries five, joined at the bafe, obcordate, placed under the filaments. Capfule of five cells.

The following examples will be fufficient for the illuftration of this dubious genus.

M. *verticillata*. Linn. Mant. 59. Cavan. Diff. fafc. 6. 324. t. 176. f. 1. (Hermannia ciliaris; Linn. Suppl. 302.) —Leaves in whorls, linear and pinnatifid. Flowers in pairs, on long ftalks.—A native of the Cape of Good Hope.—Linnæus defcribes this plant in thefe words. "*Stem* fhrubby, diffufe. *Branches* thread-fhaped. *Leaves* frequently from eight to ten in a whorl, linear, flightly divided or pinnatifid. *Inflorefcence* the fame as in *Hermannia*, terminal, the ftalks generally two-flowered. *Corolla* yellow.—Take away the nectaries from the petals, and add them to the ftamens, and you will have a *Hermannia*, (paradoxical as it may feem) with whorled leaves. What a ftrange generic metamorphofis!"

M. *pinnata*. Linn. Syft. Veg. ed. 14. 308. Curt. Mag. t. 277.—Leaves three-parted, pinnatifid.—A native of the Cape, whence it was introduced by M. P. Miller, in 1752. It flowers from June to Auguft.—*Stem* fhrubby, nearly three feet in height. *Branches* flender and delicate, with a reddifh *bark*. *Flowers* in clufters, lateral, of a lively red colour when firft expanded, drooping like little bells, moftly two together. Linnæus originally efteemed this a fpecies of *Hermannia*.

M. *incifa*. Willd. n. 5. Curt. Mag. t. 353. Jacq. Hort. Schoenb. v. 1. 28. t. 54.—Stem erect, rough. Leaves pinnatifid, cut and hairy.—A native of the Cape, flowering through the fummer and autumn.—Nearly allied to the laft in fize and habit, but differs in the fingular hairinefs of its ftalks, form of its leaves, and colour of its flowers. *Stem*, when viewed with a magnifying glafs, befet with little protuberances from whence iffue tufts of pellucid hairs. *Leaves* deeply jagged at their edges. *Flowers*, when in bud, of a rich crimfon colour, but, when expanded, of a deep orange, becoming yellow as they fade.

M. *glabrata*. Willd. n. 6. Ait. Hort. Kew. ed. 2. n. 4. (M. odorata; Andr. Bot. Repof. t. 85.)—Leaves lanceolate, pinnatifid and toothed. Stalks very long, bearing two flowers.—Found alfo at the Cape. It blooms in the fummer.—This fpecies was firft fent to England about 1792.—*Stem* twiggy, and branched. *Leaves* dark green, the upper ones fimple and oppofite. *Flowers* yellow, fragrant like the Jonquil.

The remaining fpecies of *Mahernia*, enumerated by Willdenow, are, *pulchella*, *diffufa*, *heterophylla* and *biferrata*.

Mahernia, in *Gardening*, comprifes plants of the fhrubby exotic kind, for the green-houfe, of which the fpecies cultivated are, the wing-leaved mahernia (M. pinnata); and the cut-leaved mahernia (M. incifa.)

Method of Culture.—Thefe different plants may be increafed by planting cuttings of the young branches in the fummer feafon fingly, in pots of light mould, watering, and plunging them in a hot-bed till they have ftricken root. When they have been well rooted, they may be removed into the green-houfe for protection during the winter feafon; being managed as the lefs tender plants of this defcription.

All of them afford variety among other potted plants of a fimilar kind in green-houfe collections.

MAHESA and Maheswara, in *Mythology*, names of the Hindoo god Siva; the fame, indeed, as *Ifa* and *Ifwara* (which fee) with the epithet Maha, or *great*, prefixed. Thefe names and allufions to them occur perpetually in Hindoo books. The following example from the Gita Govinda of Jayadeva, (fee Jayadeva,) as tranflated by fir William Jones, fhews their prevalence, and is defcriptive alfo of the appearance and attributes of Mahefa, or Mahadeva, and of Krifhna. (See Krishna.) The laft-named deity, agonized by the jealous anger of Radha, exclaims "Grant me but a fight of thee, O lovely Radhika! for my paffion torments me. I am not the terrible Mahefa; a garland of water lilies, with fubtile threads, decks my fhoulders, not ferpents with twifted folds: the blue petals of the lotos glitter on my neck, not the azure gleam of poifon: powdered fandal wood is fprinkled on my limbs; not pale afhes. O god of love, miftake me not for Mahadeva; wound me not again (fee the fable here alluded to, under article Kama); approach me not in anger; hold not in thy hand the fhaft barbed with an amra flower. My heart is already pierced by arrows from Radha's eyes, black and keen as thofe of an antelope; yet mine eyes are not gratified by her prefence. Her's are full of fhafts; her eyebrows are bows, and the tips of her ears are filken ftrings: thus armed by Ananga (or Kama) the god of defire, fhe marches, herfelf a goddefs, to enfure his triumph over the vanquifhed univerfe. I meditate on her delightful embrace; on the ravifhing glances darted from the fragrant lotos of her mouth; on her nectar-dropping fpeech; on her lips, ruddy as the berries of the bimba." See Radha.

MAHESRA, in *Geography*, a town of Hindooftan, in Mewat; 15 miles S.W. of Cottila.

MAHESWARI, in *Hindoo Mythology*, a name of Parvati, as the Sakti, or confort of Siva, in his character of *Mahefa*, which fee. She is reprefented, like her lord, four-armed, holding a trident, with a vaft ferpent for a ring, a crefcent for a gem, and riding on a bull. She is reckoned one of the Matris, or divine mothers of the celeftials. See Matri.

MAHHRA, in *Geography*, a diftrict of Arabia, included by the Arabians within the province of Hadramaut. This diftrict feems, like Tehama, to be a fandy plain, extending in breadth from the fhores of the ocean, backward to the part in which the hilly country commences. Thefe plains have probably been once covered by the fea.

MAHIDESER, a town of Perfia, in the province of Irak; 78 miles S.W. of Hamadan.

MAHIE, the name given by the inhabitants of Otaheite, or George's ifland, to their bread-fruit when made into a kind of four pafte, which, in confequence of having undergone a fermentation, will keep a confiderable time, and fupply them with food when no ripe fruit is to be had. When, therefore, they fee a great fhow of new fruit on the trees, they ftrip them all at once of their former crop, of which they make mahie. This fuccedaneum for ripe bread fruit is thus made. They gather the fruit before it be perfectly ripe, and laying it in heaps cover it clofely with leaves. In this ftate it ferments, and becomes difagreeably fweet; the core is then taken out entire, and the reft of the fruit thrown into a hole in their houfes, dug on purpofe, and neatly lined in the bottom and fides with grafs. The whole is then covered with leaves, and heavy ftones are laid upon them. In this ftate it undergoes a fecond fermentation, and becomes four, after which it will fuffer no change for many months. It is taken out of this hole, as it is wanted for ufe, and being made into balls, it is wrapped up into leaves and baked, and thus dreffed it will keep for five or fix weeks. It is eaten, both cold and hot, and the natives of thofe countries feldom make a meal without it: but to captain Cook and his company the tafte was as difagreeable as that of a pickled olive generally is, the firft time it is eaten. Hawkefworth's Account, &c. vol. ii. p. 145, 193.

MAHIM, in *Geography*, a town of Hindooftan, in the northern part of the ifland of Bombay, with a cuftom houfe; 17 miles N. of Bombay.

Mahim, *Mahem*, *Maihem*, or *Mayhem*, in *Law*, a *maim*, or corporal hurt, whereby a man lofeth the ufe of any member, that is, or may be, of defence to him in battle; as, befides arms and legs, the eye, hand, foot, fcalp of the head, fore-tooth; or, as fome fay, a finger or toe: but the cutting off his ear or nofe, or lofs of his jaw-teeth, are not held to be mayhems at common law, becaufe they do not weaken but only disfigure him. (Finch L. 204. 1 Hawk. P.C. 111.) The word comes from the French *mehain*, of *mehaigner*, *to mutilate*: the canonifts call it *membri mutilatio*; and all agree it confifts in the lofs of a member, or of the ufe thereof.

By the ancient law of England, he that maimed any man was fentenced to lofe the like part, (membrum pro membro) which is ftill the law in Sweden; but this was difufed, and mayhem, by the common law, (1 Hawk. P. C. 112.) was only punifhable by fine and imprifonment; unlefs perhaps the offence of mayhem by caftration, which all our old writers held to be felony. But by fubfequent ftatutes the crime and punifhment of mayhem were put more out of doubt. By 5 Hen. IV. cap. 5. cutting out the tongue, or putting out the eyes of a man, to prevent him being an evidence againft thofe who beat, wounded, or robbed him, was an offence declared to be felony, if done of malice prepenfe, that is, as fir Edward Coke explains it, voluntarily, and of a fet purpofe, though done upon fudden occafion. The ftatute 37 Hen. VIII. c. 6. directs, that if a man fhall malicioufly and unlawfully cut off the ear of any of the king's fubjects, he fhall not only forfeit treble damages to the party grieved, to be recovered by action of trefpafs at common law, as a civil fatisfaction; but alfo 10*l.* by way of fine to the king, which was his criminal amercement; and by 22 and 23 Car. II. c. 1, called the Coventry Act, it is enacted, that if any one fhall of malice aforethought, or by lying in wait, cut out

out or disable the tongue, put out an eye, slit the nose, cut off the nose or lip, or cut off or disable any limb or member of another person, with intention in so doing to maim or disfigure him, it is felony without benefit of clergy in such offender, his counsellors, aiders and abettors; and, when the case is difficult to judge whether it be a mahim, or not, the judges commonly view the party wounded, and sometimes take the opinion of the surgeons. 2 Roll. Abr. 578. (See EXAMINATION.) By analogy to this, in an action of trespass for mayhem, the court (upon view of such maihem as the plaintiff has laid in his declaration, or which is certified by the judges who tried the cause to be the same as was given in evidence to the jury) may increase the damages at their own discretion. 1. Sid 108.

A person who maims himself, for the purpose of begging, and also a person who disables himself, that he may not be impressed for a soldier, may be indicted and fined. The offence of wilfully and maliciously shooting at any person, which may endanger either killing or maiming him, though no such evil consequence ensues, is made felony without benefit of clergy, by 9 Geo. I. c. 22.

A horrible practice having of late years prevailed among pickpockets and others, of lacerating those who were the objects of depredation or resentment, and the laws being found inadequate to reach and efficiently correct the evil, the legislature interfered, and by the 43 G. III. c. 58. (commonly called lord Ellenborough's act) which recites that divers cruel and barbarous outrages had been of late wickedly and wantonly committed upon the persons of his majesty's subjects, either with intent to murder, to rob, or to maim, disfigure or disable, or to do other grievous bodily harm to such subjects, and that the provisions by law made for the prevention of such offences had been found ineffectual for that purpose, it is enacted that if any person or persons shall willfully, maliciously, and unlawfully stab or cut any of his majesty's subjects, with intent in so doing, or by means thereof to murder or to rob, or to maim, disfigure, or disable such subject or subjects, or with intent to do some other grievous bodily harm, or to obstruct, resist, or prevent the lawful apprehension and detainer of the person or persons so stabbing or cutting, or of any of his, her, or their accomplices, for any offences for which he, she, or they may respectively be liable by law to be apprehended, imprisoned, or detained; such persons so offending, their counsellors, aiders, and abettors, knowing of or privy to such offence, shall be felons, and suffer death without benefit of clergy. Provided, that if it appear on the trial, that such acts of stabbing or cutting were committed under such circumstances as that, if death had ensued therefrom, the same would not have amounted to murder, in such cases, the person or persons so indicted shall be deemed not guilty of the felonies whereof they shall be so indicted, but be thereof acquitted. § 1.

If the maim come not within any of the descriptions in either of these acts, yet it is indictable at the common law, and may be punished by fine and imprisonment; or an appeal may be brought for it at the common law; in which the party injured shall recover his damages; or he may bring an action of trespass; which kind of action hath now generally succeeded to the place of appeals in smaller offences not capital. 2 Hawk. c. 23.

Malicious maiming of cattle in the night time incurs a forfeiture of treble damages, by action of trespass, or upon the case, 22 & 23 Car. II. c. 7.

MAHEM, *Appeal of*. See APPEAL.

MAHLBERG, in *Geography*, a town of Baden, with an annexed lordship; 16 miles S.S.E. of Strasburg. N. lat. 48° 19'. E. long. 7° 15'.

MAHLENDORF, a town of Silesia, in the province of Neisse; 9 miles N.W. of Neisse.

MAHMOODABAD, an ancient town of Hindoostan, formerly the capital of Guzerat, and founded by sultan Mahmood, in the 11th century. The Ayin Acbaree describes the walls of it, as including a vast extent of ground, and speaks of it, in the latter part of the 16th century, rather as an existing city, than as a place in ruins; 17 miles S.S.E. of Amedabad. N. lat. 22° 47'. E. long. 72° 52'.

MAHMORA, or MAMORA, a sea-port town of Fez, situated near the mouth of the river Seboo, which falls into the Atlantic. The fort of Mamora, which is to the south of the Seboo, is the first inhabited place in the province of Beni-hassen. It was begun by the Portuguese in 1515, and destroyed in the same year by the Moors. It was rebuilt in 1604 by the Spaniards, from whom it was taken by Muly Ishmael in 1681. This fortress, which was originally built at the mouth of the river Seboo, is now two miles distant from it, in consequence of the drifted sand-banks and bars, which have rendered the entrance of this river so difficult and dangerous, as to be no longer of any use to commerce or navigation. At this fort there are about 35 or 40 families, which gain a wretched subsistence by the profits of their ferry, and fishing for shads, of which they take such numbers as to be able to supply the whole neighbouring country between November and the end of March. Mamora is distant about five leagues N.N.E. from Sallee, and about twenty leagues by land S. of Laracha. Between these two last places the country is variegated by lakes, forests, and vallies, which were formerly tolerably populous. Some of the lakes are nearly eight leagues in extent, and supply great numbers of ducks and water-fowls, and also of eels. The boats used by the fishermen are a kind of skiffs, made of reeds and rushes, about six feet long, and two broad, and will scarcely hold a single person. The fisherman guides them with a pole, and pierces the eels when he has them on the water, with a sort of dart. On the banks of these lakes are several sanctuaries of the Maraboots, who are held in great veneration for their supposed holiness, and a number of camps of the Moors, who cultivate the adjacent lands, which are but moderately productive. This valley is very pleasant in winter and spring, but in summer it is parched and disagreeable. At the southern extremity is a sanctuary, on an eminence, appertaining to which are habitations and gardens. N. lat. 34° 25'. W. long. 6° 25'.

MAHMOUD, in *Biography*, first sultan of the Gaznevide dynasty, and a great conqueror, was son of the governor of Chorasan, and sovereign of Gazna. He was sixteen years of age when his father died in 997, and soon displayed a vigour of mind which announced his future greatness. Having secured himself upon the throne of Gazna, he marched to Chorasan, which had been seized by the king of Turkestan, drove him out, and took possession of the province. In 1001, this heroic prince carried his arms into Hindoostan, and captured Gebal, a powerful prince in that country, who, in consequence, resigned his crown to his son, and threw himself into the flames. In the following year, Mahmoud reduced Khalif, the revolted governor of Segestan, and assumed the title of sultan. He repeated his invasion of India, but was soon recalled by the irruption of Ilek Khan, king of Turkestan, into Chorasan. Ilek was soon expelled; but he called to his assistance Kader Khan, who joined him with 50,000 horse. This combined and very powerful army advanced to the city of Balk, where they were met by Mahmoud,

Mahmoud, when a battle enfued, which was fought with great obftinacy, but Mahmoud was victorious, and the greateft part of the Turkifh army perifhed on the field. Mahmoud now extended his conquefts far and wide, and acquired immenfe treafures. The emperor of Hindooftan, who had till now affumed the title of king of kings, dreading his arms, fent to demand peace from him, which was granted, on the condition of the payment of a large tribute. In 1029, he added to his other extenfive dominions the great province of Perfian Irak, and fettled his fon Maffoud, whom he deftined for his fucceffor. He died in 1030, after a profperous reign of thirty-one years. This great conqueror, who ftripped fo many neighbouring fovereigns of their territories, is extolled by Mahometan writers for his regard to juftice, and for his zeal in the propagation of his religion, which he fpread in India by the extermination of a vaft number of idolaters, and the demolition of their temples. Several anecdotes are given of him which do honour to his forbearance, and his regard to juftice. In one inftance a widow preferred a complaint againft fome perfons who had murdered her fon; the fultan replied, that the great diftance of Irak from Gazna rendered it very difficult for him to prevent fuch diforders: "Why then," faid the difconfolate woman, "do you conquer more territory than you can govern, and of which you can render no account at the day of judgment." The reproof awakened fuch impreffions in the mind of the monarch, that he caufed it to be proclaimed throughout Irak, that he would be refponfible for the lives and properties of all who fhould, in future, travel thence to India in caravans. Univer. Hift.

MAHMUDPOUR, in *Geography*, a town of Bengal; 14 miles S. of Boglipour.—Alfo, a town of Bengal, capital of the circar of Boofnah; 84 miles S.E. of Moorfhedabad. N. lat. 23° 35'. E. long 89° 42'.

MAHMUDSHI, a circar of Bengal, bounded on the N E. and S. by Boofnah, on the W. by Shahjole, and on the N.W. by Ranjefhy, about 35 miles long, and 22 broad. Its capital is Nuldingah.

MAHO Tree, in *Botany*. See Hibiscus.

MAHOBA, in *Geography*, a town of Hindooftan, in the circar of Gohud: 20 miles S.E. of Raat.

MAHOGANY. See Swietenia.

MAHOMDY, in *Geography*, a town of Hindooftan, in the country of Oude; 70 miles N.W. of Lucknow. N. lat. 27° 54'. E. long. 80° 32'.

MAHOMEDABAD, a town of Hindooftan, in Oude; 13 miles E. of Azimgur.

MAHOMET, or Mohammed, in *Biography*, the founder of that fyftem of religious impofture which is called *Mahometanifm* (which fee), defcended from the tribe of Koreifh, and the family of Hafhem, the moft illuftrious of the Arabs, the princes of Mecca, and the hereditary guardians of the Caaba: he was the grandfon of *Abdalmotalleb* (which fee), and the only fon of *Abdallah* (which fee), and Amina; and he was born at Mecca, four months after the death of Juftinian, and two months after the defeat of the Abyffinians, whofe victory would have introduced into the Caaba the religion of the Chriftians, in the year 569 of the Chriftian era. As he was deprived of his grandfather, father, and mother in his infancy, and his inheritance confifted only of five camels and one Ethiopian female flave, the care and conduct of his youth devolved upon Abu Taleb, the moft refpectable of his uncles, by whom he was initiated in the occupation of a merchant, and with this view he was taken with him into Syria at the age of thirteen years. In his 25th year he was recommended to Khadijah, a noble and rich widow, as her factor, who foon rewarded his fidelity with the gift of her hand and fortune, and thus raifed him to an equality with the richeft perfons in Mecca. In his marriage contract he is defcribed as the moft accomplifhed of the tribe of Koreifh, and his dowry is ftipulated at twelve ounces of gold and twenty camels, which was fupplied by the liberality of his uncle. In confequence of this connection, he was reftored to the ftation of his anceftors; and he paffed many years in the habits of domeftic life, until at length, in the 40th year of his age, he affumed the title of a prophet, and proclaimed the religion of the Koran. According to the tradition of his companions, Mahomet was diftinguifhed by the graces of his perfon and manners, fo that before he fpoke he engaged in attachment and intereft the affections of a public or private audience. His attendants applauded his commanding prefence, his majeftic afpect, his piercing eye, his gracious fmile, his flowing beard, his countenance that painted every fenfation of the foul, and each gefture that enforced every expreffion of his tongue. In the intercourfe of private life he blended, with refpectful attention to the affluent and powerful, condefcenfion and affability to the pooreft citizens of Mecca; the franknefs of his manner concealed the artifice of his views; and the habits of courtefy were imputed to perfonal friendfhip or perfonal benevolence. His memory was capacious and retentive; his wit eafy and focial; his imagination fublime; his judgment clear, rapid, and decifive. He poffeffed, fays one of his biographers, the courage both of thought and action; and although his defigns might probably expand with his fuccefs, the firft idea which he entertained of his divine miffion bears the ftamp of an original and fuperior genius. Educated amidft the nobleft race, he acquired a fluency of fpeech in the pureft dialect of Arabia; and he had the art, on proper occafions, of obferving a difcreet filence. Notwithftanding all thefe accomplifhments, he was an illiterate barbarian; infomuch that his youth had never been inftructed in the arts of reading and writing. Some, indeed, have queftioned this fact, among whom we may reckon Mr. White (fee his Sermons, p. 203, 204.); but his incredulity, founded more on conjecture and reafoning, than authentic teftimony, is contradicted by numerous and unexceptionable authorities. Availing himfelf of the character of the age in which he lived, and of the circumftances of the people among whom his lot was caft, his fagacity led him to improve even his want of literature as a means of more fuccefsfully gaining profelytes and propagating his impofture. In his two journies to Syria, he reftricted his attention to commercial tranfactions at the fairs of Boftra and Damafcus; and at the early age in which he made thefe journies, he could derive no great advantage with regard to the purpofes of his pretended miffion from fuch hafty and fuperficial excurfions: nor could he have indulged his curiofity to any confiderable degree on account of his ignorance of the Syriac language. Whatever knowledge he acquired muft have been the refult of his intercourfe with thofe pilgrims who annually reforted to Mecca from various regions, with views of devotion, or of commerce; and from this fource he derived that acquaintance with the political ftate and character of the feveral Arabian tribes, as well as the theology and ceremonial inftitutions of Jews and Chriftians. Befides, from his earlieft youth, Mahomet was addicted to religious contemplation; and he was accuftomed, during the month of Ramadan, to retire from the world to the cave of Hera, about three miles from Mecca, where he probably formed his fyftem of impofture; or, as Mr. Gibbon expreffes it, where he confulted the fpirit of fraud or enthufiafm, whofe abode is not in the heavens, but in the mind of the prophet. The faith, as the hiftorian adds, which, under the name of

 "Iflam,"

"Islam," he preached to his family and nation, is compounded of an eternal truth, and a necessary fiction, "That there is only one God, and that Mahomet is the apostle of God." It is impossible, at this distance of time, and amongst the variety of opinions that have been held on the subject, to determine with certainty at what period of his life the idea of framing a new system of religion occurred to his mind; nor can it be ascertained by what kind of reflection he was led among idolaters to form his idea of the unity of God, nor to what degree he blended the ambition of personal grandeur with that of the prophetic character. History furnishes examples of persons whose conviction of truth and ardour in the prosecution and dissemination of it have terminated in the licentiousness of enthusiasm, the rage of conquest, and the violence of tyranny. Perhaps this might, in a degree, have been the case with Mahomet; and he might have proceeded from the honesty of enthusiasm to the extreme of imposture and despotism, and with a view of extending the influence of his system, he might find it necessary or expedient to accommodate it to the passions and prejudices of his countrymen, to enforce it by the terrors of the sword, and to unite the character of a conqueror with that of an impostor. It was, however, in the year 609, and about the 40th year of his age, called "the year of his mission," that he opened his pretended mission. His first convert was his wife Khadijah, to whom he communicated an interview, with which he had been favoured by the angel Gabriel, who had told him, that he was appointed the apostle of God; and to whom he also repeated a passage, which he pretended to have had revealed to him by the ministry of the angel, together with some other circumstances of this first appearance, which are related by Mahometan writers. Khadijah received the news with great joy, and hastened to impart it to her cousin Warahah, who, being a Christian, was well acquainted with the Scriptures, and who immediately became a proselyte. Cautious in announcing to the public the high and honourable office with which he was entrusted, he determined to strengthen his interest by the conversion of the other branches of his family. His next proselyte was Zeid, a confidential servant, to whom on this occasion he gave his freedom; and this circumstance established a precedent for his followers. The conversion of Zeid was succeeded by that of his cousin Ali, the son of Abu Taleb, who has been commonly styled, probably on account of his rank and zeal in the cause, "the first of believers." But the principal accession to his cause, with regard to respectability and influence, was that of Abubeker, a person of great authority in the tribe of Koreish, who prevailed on ten other principal inhabitants of Mecca to follow his example. During three years Mahomet proceeded without exciting public attention: but in the fourth year of his mission, he openly assumed the prophetic office, and announced his having received a divine appointment for the illumination and conversion of his near relations. With this view he directed Ali to prepare an entertainment, and to invite the sons and descendants of Abdalmotalleb to a participation of it. When about 40 of the race of Hashem were assembled, Mahomet addressed them with the offer of happiness both in this life and in that which is to come, for which he pleaded a divine authority and command: and he then asked them who would be his companion and vizir? Whilst a general silence prevailed, Ali exclaimed, "O Prophet, I am the man: I will be thy vizir; and I will inflict vengeance on those who oppose thee!" Upon this declaration of attachment and furious zeal in his service, Mahomet commanded all that were present to obey Ali as his deputy: the company, however, treated the order with contempt, and ironically exhorted Abu Taleb to respect the superior dignity of his son. In a more serious tone, the father of Ali advised him to abandon his impracticable, romantic, and dangerous design. Mahomet, however, was not intimidated, but resolutely told his uncle, "that if they set the sun against him on his right hand, and the moon on his left, he would not relinquish his enterprise." When Abu Taleb perceived that he was determined to proceed, he used no further arguments to dissuade him, but promised to stand by him against all his enemies. The Koreish, finding that reasoning and intreaty were ineffectual, had recourse to threats and violence; so that the followers of Mahomet could not continue any longer at Mecca with safety; upon which Mahomet, unable to protect them, gave them leave to depart and seek refuge wherever they could find it. Accordingly, in the fifth year of the prophet's mission, sixteen, of whom four were women, fled into Ethiopia; and these were afterwards followed by others, amounting to the number of 83 men and 18 women, besides children. The king of Ethiopia received them with kindness, and refused to deliver them up when the Koreish sent to demand them; and, as the Arab writers unanimously attest, became himself a proselyte to the Mahometan religion. Persecution, instead of retarding, accelerated the progress of this imposture. In the seventh year of the mission of the pretended prophet, his friends had become more numerous and powerful, by the conversion of his uncle Hamza, and of the inflexible Omar, who had been once his most violent opposer; and the Koreish having formed a league against the Hashemites occasioned a division of their tribe into two factions; one of which adhered to the prophet and the other combined against him. For three years this variance continued, but in the tenth year of his mission, Mahomet told his uncle Abu Taleb, that God had signally manifested his disapprobation of the league, which the Koreish had formed against them, by sending a worm to eat every word of the instrument, except the name of God. When a deputation had examined the league, that had been laid up in the Caaba, and found that Mahomet's declaration was true, it was declared void. In this year Mahomet lost two very important and useful friends, *viz.* his wife Khadijah, and his uncle Abu Taleb; and for this reason this year was called "the year of mourning." Upon the death of these two persons the Koreishites became more violent than ever, and determined on the death of the prophet; but being warned of their purpose by an angel or spy, he retired hastily, and in the dead of the night, with his friend Abubeker, to the distance of a league from Mecca, where he concealed himself for three days in the cave of Thor, and where he and his friend received a supply of food and of intelligence from the son and daughter of Abubeker. The Koreish made diligent search for the fugitives, but being at the entrance of the cavern in which they were hidden, their attention was diverted, as it is said, by a spider's web, and a pigeon's nest, which led them to imagine that the place was solitary and inviolate. "We are only two," said the trembling Abubeker: "there is a third," replied the prophet, "it is God himself." As soon as they had opportunity for escape, they mounted their camels; but on the road to Medina, they were overtaken by the emissaries of the Koreish, from whose hands they rescued themselves by the influence of prayers and promises. The flight of the prophet from Mecca to Medina has fixed the memorable era of the *Hegira*, which see. At Medina the two fugitives found an asylum. Some of the noblest citizens had previously, in a pilgrimage to the Caaba at Mecca, been converted by the preaching of Mahomet, and on their return they had diffused the belief of God and his prophet; and the new alliance was ratified by their depu-

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ties in two fecret and nocturnal interviews on a hill called Al Akaba, in the fuburbs of Mecca, when they protefted in the name of their wives, children, and abfent brethren, that they would for ever profefs the creed, and obferve the precepts of the Koran. The fecond was a political affociation, the firft vital fpark, fays Gibbon, of the empire of the Saracens. Seventy-three men and two women of Medina held a folemn conference with Mahomet, his kinfmen, and difciples, in the thirteenth year of his miffion, and pledged themfelves to each other by an oath of mutual fidelity. After reciprocal engagements to each other, they reiterated the oath of allegiance and fidelity, and their treaty was ratified by the people, who unanimoufly embraced the profeffion of Iflam. Such were their circumftances, when they impatiently expected the arrival of the prophet, at the fame time trembling for his fafety. After a perilous and rapid journey along the fea-coaft, he halted at Koba, two miles from the city, and made his public entry into Medina, 16 days after his flight from Mecca. He was met by 500 of the citizens, and received with acclamations of loyalty and devotion. His braveft difciples affembled round his perfon; and his followers were diftinguifhed into two claffes, the fugitives of Mecca and the auxiliaries of Medina, under the denominations of "Mohagerians" and "Anfars." When Mahomet was eftablifhed at Medina, he affumed the exercife of the regal and facerdotal office; and having acquired either by gift or purchafe a piece of ground, he built upon it a temple of worfhip, and a refidence for himfelf. After a reign of fix years, 1500 Moflems, in arms and in the field, renewed their oath of allegiance; and their chief repeated the affurance of protection till the death of the laft member; or the final diffolution of the party. Being now exalted by the choice of an independent people to the rank of a fovereign, he was invefted with the prerogative of forming alliances and of waging offenfive or defenfive war, and accordingly affumed a fiercer and more fanguinary tone, than he had been accuftomed to ufe, when his moderation was the effect of his weaknefs. In announcing his revelations, he pretended to have received commands for propagating his religion by the fword, for deftroying the monuments of idolatry, and with regard to the fanctity of days or months, for purfuing the unbelieving nations of the earth. In the firft months of his reign, he trained his followers for the warfare to which he intended to conduct them, and difplayed his white banner before the walls of Medina, but in the progrefs of his undertaking he fought in perfon at nine battles or fieges; and fifty military enterprifes were achieved in ten years by himfelf or his lieutenants. Uniting the profeffions of a merchant and robber, his petty excurfions for the attack of a caravan, gradually prepared his troops for the conqueft of Arabia. The diftribution of the fpoil was regulated, as he pretended, by a divine law; a fifth of the gold and filver, the prifoners, and the cattle, the moveables and immoveables, was referved by the prophet for pious and charitable ufes: the remainder was fhared in adequate portions by the foldiers who had obtained the victory or guarded the camp; the recompence of the flain devolved to their widows and orphans; and the increafe of cavalry was encouraged by the allotment of a double fhare to the horfe and the man. From all fides, fays the hiftorian, the roving Arabs were allured to the ftandard of religion and plunder; the prophet indulged the difpofition of his countrymen by fanctifying the licence of embracing the female captives as their wives or concubines; and the enjoyment of wealth and beauty was a feeble type of the joys of paradife prepared for the valiant martyrs of the faith. "The fword," fays Mahomet, "is the key of heaven and of hell; a drop of blood fhed in the caufe of God, a night fpent in arms, is of more avail than two months of fafting or prayer; whoever falls in battle, his fins are forgiven: at the day of judgment, his wounds fhall be refplendent as vermilion, and odoriferous as mufk; and the lofs of his limbs fhall be fupplied by the wings of angels and cherubim." By fuch declarations and profpects, the intrepid fouls of the Arabs were fired with enthufiafm; the picture of the invifible world was ftrongly painted on their imagination; and the death which they had always defpifed, became an object of hope and defire. The prophet, with a fagacity which diftinguifhed every part of his project, inculcated in the Koran the tenets of fate and predeftination, which have ferved in every age to exalt the courage of the Saracens and Turks. The firft companions of Mahomet advanced to battle with a fearlefs confidence; where there is no chance, there is no danger: they were ordained to perifh in their beds, or they were fafe and invulnerable amidft the darts of the enemy.

The firft military expedition of any importance, and which in the event ferved to eftablifh the reputation of the prophet, was directed againft the Koreifh. This was the battle of Beder, which was fought in the fecond year of the Hegira; for an account of which, fee BEDR. This was followed by a fecond battle, A. D. 623, on mount Ohud, fix miles to the north of Medina. On this occafion the Koreifh muftered a force of 3000 men, 700 of whom were armed with cuiraffes, and 200 mounted on horfeback. Three thoufand camels attended their march; and Henda, the wife of Abu Sophian, the chief of the branch of Ommiyah, who had fucceeded to the principality of the republic of Mecca, with 15 matrons of this city, inceffantly founded their timbrels to animate the troops, and to magnify the greatnefs of Hobal, the moft popular deity of Caaba. The ftandard of God and Mahomet was upheld by only 950 believers. The Koreifh advanced in the form of a crefcent, and the right wing of the cavalry was led by Caled, the fierceft and the moft fuccefsful of the Arabian warriors. The troops of Mahomet were fkilfully pofted on the declivity of a hill; and their rear was guarded by a detachment of 50 archers. The conteft was vigoroufly maintained on both fides: it was fevere and fanguinary; Mahomet was wounded, and 70 martyrs, as they were called, are faid to have died for the fins of the people. Their bodies were mangled by the inhuman females of Mecca; and the wife of Abu Sophian tafted the entrails of Hamza, the uncle of Mahomet. The Muffulmans rallied in the field; and the Koreifh wanted ftrength and courage to undertake the fiege of Medina. In the year 625 the city was attacked by an army of 10,000 enemies; and this third expedition is named from the "nations" which marched under the banner of Abu Sophian, and from the "ditch" which was drawn before the city and a camp of 3000 Muffulmans, the battle of the "Nations" or "Ditch." Mahomet prudently declined a general engagement; and though the conteft was protracted for 20 days, the confederates were at length obliged to feparate. A tempeft of wind, rain, and hail, overturned their tents; private quarrels were fomented by an infidious adverfary; and the Koreifh, deferted by their allies, no longer hoped to fubvert the throne, or to check the conquefts, of their invincible exile. As foon as the "nations" had retired from the "ditch," Mahomet, without laying afide his armour, marched againft the Jewifh tribe of Koraidha, who had incurred his refentment by exciting and joining the war of the Koreifh; and after a refiftance of 25 days, they furrendered at difcretion. It was in vain that they appealed to the judgment of a venerable elder; he pronounced the fentence of their death; 700 of them were dragged in chains to the market place of the city; and hav-

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ing been compelled to defcend alive into the grave prepared for their execution and burial, the prophet beheld the favage fcene without emotion. Plunder and cruelty marked his future footfteps; and the town of Chaibar, which was the feat of the Jewifh power in Arabia, and its numerous caftles, were fpeedily reduced. It is fomewhat fingular, that a hatred of the Jews, to whofe Scriptures he was indebted for the beft parts of his religion, formed fo diftinguifhing a feature in the character of the Arabian prophet. Under the fubfequent reign of Omar, the Jews of Chaibar were tranfplanted to Syria; and the caliph alleged the injunction of his dying mafter, that one and the true religion fhould be profeffed in his native land of Arabia. Such was the fpirit of perfecution and intolerance which actuated this impoftor. In the year 629 Mahomet directed his march, accompanied by 1400 men, towards Mecca: his views were peaceable; 70 camels, chofen and bedecked for facrifice, preceded the van; the facred territory was refpected, and the captives were difmiffed, without ranfom, to proclaim his clemency and devotion. But on his approach to the city, the Koreifh oppofed his progrefs, and he determined to attack it; but on their fuing for peace, he concluded with them and with their allies a truce of 10 years, engaging to reftore the fugitives of Mecca who fhould embrace his religion, and ftipulating merely, for the enfuing year, the privilege of entering the city as a friend, and of remaining three days to accomplifh the rites of the pilgrimage. After the cuftomary facrifice, Mahomet evacuated the city on the fourth day. The people were edified by the devotion of the prophet, who on this occafion acted the part of a crafty politician; the hoftile chiefs were awed, or divided, or fubdued; and both Caled and Amrou, the future conquerors of Syria and Egypt, moft feafonably deferted the finking caufe of idolatry. The Arabian tribes fubmitted and thus increafed the power of Mahomet; 10,000 foldiers affembled for the conqueft of Mecca, and the idolaters, being the weaker party, were eafily convicted of violating the truce. The fecret was preferved till 10,000 fires proclaimed to the aftonifhed Koreifh the defign, the approach, and the irrefiftible force of the enemy. The haughty Abu Sophian prefented the keys of the city, obferved that the fon of Abdallah had acquired a mighty kingdom, and confeffed, under the fcymetar of Omar, that he was the apoftle of the true God. Mahomet, inftead of indulging his own paffion of revenge or that of his followers, forgave the guilt, and united the factions of Mecca. His troops, in three divifions, marched into the city and took poffeffion of it; the chiefs of the Koreifh fell proftrate at his feet; the people of Mecca merited their pardon by the profeffion of Iflam, and after an exile of feven years, the fugitive miffionary was enthroned as the prince and prophet of his native country. But the 360 idols of the Caaba were ignominioufly demolifhed: the houfe of God was purified and adorned; and a perpetual law was enacted, that no unbeliever fhould dare to fet his foot on the territory of the holy city. The conqueft of Mecca determined the faith and obedience of the Arabian tribes; but an obftinate remnant ftill adhered to the religion and liberty of their anceftors; and the war of Honain derived its appellation from the "idols," whom Mahomet had vowed to deftroy, and whom the confederates of Tayef had fworn to defend. Four thoufand pagans advanced with fecrecy and fpeed to furprife the conqueror; the banners of Mecca and Medina were difplayed by the prophet; and 12,000 Muffulmen entertained a rafh and finful prefumption of their invincible ftrength. They defcended without precaution into the valley of Honain; but their number was oppreffed by the archers and flingers of the confederates who had occupied the heights, their difcipline was confounded, their courage was appalled, and the Koreifh anticipated with fatisfaction their impending deftruction. The prophet, on his white mule, was encompaffed by the enemies; of ten faithful companions, who attempted to ward off from him the fpears of the affailants, three fell dead at his feet; and in this moment of danger, he called on his brethren and on the Almighty for fuccour, whilft his uncle Abbas joined in the acclamations of his followers. At length the fugitive Muffulmen rallied; the battle was renewed by the exhortation and example of the prophet; and he animated his victorious troops to inflict a mercilefs revenge on the authors of their difgrace. From the field of Honain he haftened to the fiege of Tayef, 60 miles S E. of Mecca; but after an ineffectual attack of 20 days, he was obliged to retreat. The fpoil of this expedition amounted to 6000 captives, 24,000 camels, 40,000 fheep, and 4000 ounces of filver. Inftead of chaftifing the difaffection of the Koreifh, he endeavoured to fecure their attachment by extraordinary liberality; Abu Sophian was prefented with 300 camels and 20 ounces of filver; and Mecca was fincerely converted to the profitable religion of the Koran. The temples and idols of Arabia were every where demolifhed, and the ambaffadors who proftrated themfelves before the throne of Medina were as numerous, according to an Arabian proverb, as the dates that fall from the maturity of a palm-tree. Hence this year was called "the year of embaffies." The nation fubmitted to the God and the fceptre of Mahomet; and 114,000 Moflems accompanied the laft pilgrimage of the apoftle. On this occafion he took with him all his wives, with a great number of camels intended for victims; and the ceremonial which he obferved at the facred city has ferved as a model to the Moflems of fucceeding ages.

It was in the 7th year of the Hegira that Mahomet began to think of propagating his religion beyond the boundaries of Arabia, and deputed meffengers to invite the neighbouring princes to embrace Mahometanifm. The Perfians with their fovereign after fome hefitation avowed themfelves profelytes. The emperor Heraclius at firft treated his meffage with refpect; and fome have faid, that he would have profeffed the new faith, if he had not been afraid of lofing his crown. Mahomet prepared for effecting by conqueft what he had failed to accomplifh by a peaceful meffage; but he was obliged to defift from the undertaking, as too hazardous, and indeed impracticable. The firft conflict between the troops of Mahomet and the emperor Heraclius took place in the eighth year of the Hegira. A body under the command of Zeid advanced to the attack of Muta, a town of Paleftine, the governor of which had affaffinated one of the Moflem envoy. In the fharp conflict that enfued, Zeid with the two next in command was flain, and the death of Zeid was much lamented by Mahomet, his mafter and friend. However, the active and intrepid Caled, denominated "the Sword of God" fpread around the terror of his name: and the prophet received the fubmiffion of the tribes and cities from the Euphrates to Ailah, at the head of the Red fea. Mahomet, in the confidence of his power, had declared war againft Heraclius; and with an army of 20,000 foot and 10,000 horfe, he marched towards the Syrian frontier, and his unwilling followers fuffered extremely from the heat of the fummer and the drought of the defert. At Tabuc, a fertile fpot in the midway between Medina and Damafcus, they pitched their camp. The confequence of this toilfome expedition was the fubmiffion of fome Arabian princes, who became tributaries; but as the Imperialifts had retired to a diftance, without appearing to have any defign of making an attack upon Arabia, Mahomet fatisfied himfelf by writing a letter to Heraclius urging his converſion, and then returned back to Medina. After his return he promulgated a new chapter of the Koran, revoking all former edicts in favour of the idolaters, and annulling all treaties that had been made with them. To his Chriſtian ſubjects, Mahomet readily granted the ſecurity of their perſons, the freedom of their trade, the property of their goods, and the toleration of their worſhip. In this reſpect he purſued a conduct highly political, as it was the intereſt of a conqueror to propoſe a fair capitulation to the moſt powerful religion of the earth: and the ſame wiſe policy has ever ſince accompanied the Mahometan juriſdiction. Till the age of 63 years, Mahomet retained a vigour of conſtitution which enabled him to endure the corporeal and ſpiritual fatigues of his miſſion. The laſt conſpicuous act of his life was his pilgrimage to Mecca, already mentioned. His health had been declining for four years previous to his death; and he aſcribed this change not to the acceſs of epileptic fits which ſome writers have erroneouſly reported to have been the remote cauſe of his growing infirmities, but to poiſon adminiſtered to him at Chaibar by a Jewiſh female, from a motive of revenge, as ſome have ſaid, or according to others, from a deſire of putting his prophetic character to the teſt. However this be, his mortal diſeaſe was a fever of fourteen days, which at intervals deprived him of the uſe of his reaſon. During the intermiſſions of his diſorder he employed himſelf in haranguing his diſciples from the pulpit, and performing other religious duties of his function, and in giving inſtructions with regard to the meaſures that were fit to be purſued after his deceaſe. He beheld, it is ſaid, with firmneſs the approach of death, ſatisfied the demands of his creditors, enfranchiſed his ſlaves, directed the order of his funeral, moderated the grief of his weeping friends, on whom he beſtowed the benediction of peace, and regularly performed the exerciſe of public prayer till the third day before his diſſolution; from all which circumſtances it has been inferred, that he really believed the truth of his miſſion, and that he derived conſolation from the conſciouſneſs of having conferred great benefits on mankind. This may be eaſily accounted for by the conſideration that enthuſiaſm was blended in a very conſiderable degree with his impoſture. The choice of Abubeker to ſupply his place indicated his reſpect for this ancient and faithful friend, as he ſeems to have thought him a fit ſucceſſor in the ſacerdotal and regal office. When his faculties were perceptibly impaired he wiſhed to dictate a divine book, which ſhould contain the form and ſubſtance of all his revelations; but a diſpute ariſing in his chamber, whether he ſhould be allowed to ſuperſede the authority of the Koran, he was under a neceſſity of reproving the indecent vehemence of his diſciples. If any credit may be given to the traditions of his wives and companions, he maintained to the laſt moments of his life and in confidential intercourſe with his family, the dignity of an apoſtle and the faith of an enthuſiaſt; deſcribing the viſits of Gabriel, and expreſſing his lively confidence, not only in the mercy, but the favour, of the Supreme Being. In a familiar diſcourſe he had mentioned his ſpecial prerogative, That the angel of death was not allowed to take his ſoul till he had reſpectfully aſked the permiſſion of the prophet. The requeſt being granted, Mahomet fell into the agony of diſſolution, and expired in the arms or on a carpet near the feet of his favourite wife Ayeſha, the daughter of Abubeker, in the month of June, A.D. 632, Hegira 11, at the age of 63. Some of his followers would not for a time believe the reality or poſſibility of his death, till Abubeker calmly reaſoned them out of their deluſion. He was interred at Medina, in a grave dug beneath the bed on which he lay in the apartment of Ayeſha, over which a magnificent building was erected by one of the ſucceeding caliphs. It is hardly neceſſary to mention, unleſs with a view of expoſing it, the vulgar and ridiculous ſtory invented and propagated by the Greeks and Latins, that Mahomet's tomb is ſuſpended in the air at Mecca, by the action of equal and potent load-ſtones: for he was not buried at Mecca, and his tomb at Medina, which has been viſited by millions, is placed on the ground. The number of his wives, all of whom except Ayeſha were widows, was at leaſt fifteen: by Khadijah he had four children, one of whom, Fatima, the beſt beloved of his daughters, and married to Ali, ſurvived him; and he had alſo a ſon, by his Egyptian concubine, Mary, whoſe name was Ibrahim, and who died not long before him. However Mahomet might reſtrict the incontinence of his diſciples by the precepts of his religion, he claimed a ſpecial exemption for himſelf, and pretended a ſpecial revelation which diſpenſed with his obſervance of the laws which he impoſed upon his nation. During the life of Khadijah, who laid the foundation of his future fortune, and in the courſe of 24 years, he ſeems to have reſtrained his ruling paſſion within due bounds; but as he advanced in years and authority, this paſſion gained ſtrength, and he made his religion ſubſervient to the illicit indulgence of it. Beſides his numerous wives, he allowed himſelf in a variety of amours, which were prohibited by his own laws. His connection with Zeinab, the wife of his enfranchiſed ſervant and adopted ſon, Zeid, gave great offence to ſome of his friends. Zeid, in order to gratify his maſter, conſented to her being divorced; and the prophet, whoſe religion was eaſily accommodated to his paſſions and intereſt, feigned a revelation from heaven, recorded in a chapter of the Koran, which authoriſed him to marry her, notwithſtanding a degree of affinity that had been always regarded by the Arabs as an abſolute prohibition. Hafna, the daughter of Omar, who was one of his wives, diſcovered him in an improper ſituation with Mary, an Egyptian captive; but in order to ſilence her reproaches, he promiſed never to repeat the offence. Finding, however, that the circumſtance was divulged to his other wives, and that they concurred in reſenting it, he withdrew from them all for a month, and ſpent the time in company with Mary; and in order to juſtify his infidelity and violation of an oath, he recurred to his uſual practice of producing a new chapter of the Koran, containing a ſpecial diſpenſation. We may indeed be aſtoniſhed that ſucceſſive forgeries of this kind, intended to anſwer purpoſes of perſonal and licentious gratification, ſhould not have excited a prejudice in the minds of his followers and of his countrymen in general, which would have defeated all his efforts for propagating his impoſture. But we ſhould recollect the diſpoſition and character of the Arabs, whoſe libidinous complexion has been noticed by the writers of antiquity. (Ammian Marcell. l. xiv. c. 4.) Much has been ſaid by Mahometan writers in praiſe of the corporeal and mental endowments of the Arabian prophet; and though we cannot allow the very extraordinary qualities which have been aſcribed to him, it muſt be acknowledged that he poſſeſſed various accompliſhments, ſome of which have already been noticed, and a verſatility of talents and character, that ſerved to raiſe him above his contemporaries, and to qualify him for the undertaking in which he embarked. "Could I truly delineate," ſays Gibbon, "the portrait of an hero, the fleeting reſemblance would not equally apply to the ſolitary of mount Hera, to the preacher of Mecca, and to the conqueror of Arabia. The author of a mighty revolution appears to have been endowed with a pious and contemplative diſpoſition: ſo ſoon as marriage

had

had raifed him above the preffure of want, he avoided the paths of ambition and avarice; and till the age of 40, he lived with innocence, and would have died without a name. The unity of God is an idea moft congenial to nature and reafon; and a flight converfation with the Jews and Chriftians would teach him to defpife and deteft the idolatry of Mecca." Indeed, for every thing that is valuable in his religious fyftem he was indebted to Judaifm and Chriftianity: but his rude and barbarous civil policy, being rendered immutable by its alliance with religion, an alliance that is incongruous and unnatural, has prevented every kind of melioration and improvemement in thofe countries where his laws are received. "It was the duty of a man and a citizen to refcue his country from fin and error. The energy of a mind inceffantly bent on the fame object would convert a general obligation into a particular call; the warm fuggeftions of the underftanding or the fancy would be felt as the infpirations of heaven; the labour of thought would expire in rapture and vifion; and the inward fenfation, the invifible monitor, would be defcribed with the form and attributes of an angel of God. From enthufiafm to impofture the ftep is perilous and flippery: the dæmon of Socrates (fee DÆMON) affords a memorable inftance how a wife man may deceive himfelf, how a good man may deceive others, how the confcience may flumber in a mixed and middle ftate between felf-illufion and voluntary fraud. Charity may believe that the original motions of Mahomet were thofe of pure and genuine benevolence; but a human miffionary is incapable of cherifhing the obftinate unbelievers who reject his claims, defpife his arguments, and perfecute his life;"—hence "the paffions of pride and revenge were kindled in the bofom of Mahomet."—"The injuftice of Mecca, and the choice of Medina, transformed the citizen into a prince, the humble preacher into the leader of armies."—"In the exercife of political government, he was compelled to abate of the ftern rigour of fanaticifm, to comply in fome meafure with the prejudices and paffions of his followers, and to employ even the vices of mankind as the inftruments of their falvation: the ufe of fraud and perfidy, of cruelty and injuftice, was often fubfervient to the propagation of the faith; and Mahomet commanded and approved the affaffination of the Jews and idolaters, who had efcaped from the field of battle. By the repetition of fuch acts, the character of Mahomet muft have been gradually ftained; and the influence of fuch pernicious habits would be poorly compenfated by the practice of the perfonal and focial virtues which are neceffary to maintain the reputation of a prophet among his fectaries and friends. Of his laft years, ambition was the ruling paffion; and a politician will fufpect, that he fecretly fmiled (the victorious impoftor!) at the enthufiafm of his youth and the credulity of his profelytes." Mahomet, in his private and domeftic life, feems to have defpifed the pomp of royalty, and to have fubmitted to the menial offices of the family. The interdiction of wine was confirmed by his example, and his ordinary food confifted of barley-bread, milk and honey, dates and water. Although he indulged himfelf in fenfual gratifications, the incontinence of his countrymen was regulated by the civil and religious laws of the Koran: their inceftuous alliances were blamed; the boundlefs licence of polygamy was reduced to four legitimate wives or concubines; their rights both of bed and of dowry were equitably determined; the freedom of divorce was difcouraged; adultery was condemned as a capital offence; and fornication, in either fex, was punifhed with an hundred ftripes.

It is a natural inquiry how Mahomet, without literature, without pretending to the power of working miracles, and without a character that entitled him to veneration among perfons who made any pretence to religion and virtue, fecured the fuccefs of a fyftem of doctrine and practice, which muft have appeared to all but his prejudiced followers to have originated in enthufiafm and impofture?—a fyftem which reftricted the boundlefs licence of Arabian idolatry; which impofed obligations of prayer, purification, and almsgiving, that were burthenfome; and which undermined the intereft and influence of fome of the moft powerful and affluent of his countrymen? The bafis of his doctrine, we have already faid, was the truth of the unity and fpiritual nature of the deity: this truth muft have approved itfelf to the minds of the thoughtful; and the vulgar would be allured by the profpects which he held out to them of a future happinefs, adapted to their groffer apprehenfions and paffions. Whilft we admit that, in the early period of his pretended miffion, he might have been actuated by a fincere defire of ameliorating the faith and manners of his countrymen, and allow his character to have poffeffed fome traits of the patriot and reformer, pride and ambition were his ruling principles; and his difcriminating character muft be that of an ufurper and impoftor, who owed his fuccefs more to the accommodating nature of his doctrine, and to the power of the fword, than to any other caufe. "Are we furprifed," fays Mr. Gibbon, "that a multitude of profelytes fhould embrace the doctrine and the paffions of an eloquent fanatic? In the herefies of the church, the fame feduction has been tried and repeated from the time of the apoftles to that of the reformers. Does it feem incredible that a private citizen fhould grafp the fword and the fceptre, fubdue his native country, and erect a monarchy by his victorious arms? In the moving picture of the dynafties of the laft one hundred fortunate ufurpers, none have arifen from a bafer origin, furmounted more formidable obftacles, and filled a larger fcope of empire and conqueft. Mahomet was alike inftructed to preach and to fight; and the union of thefe oppofite qualities, while it enhanced his merit, contributed to his fuccefs: the operation of force and perfuafion, of enthufiafm and fear, continually acted on each other, till every barrier yielded to their irrefiftible power. His voice invited the Arabs to freedom and victory, to arms and rapine, to the indulgence of their darling paffions in this world and the other. The reftraints which he impofed were requifite to eftablifh the credit of the prophet, and to exercife the obedience of the people: and the only objection to his fuccefs was his rational creed of the unity and perfections of God. It is not the propagation, but the permanency of his religion that deferves our wonder: the fame pure and perfect impreffion, which he engraved at Mecca and Medina, is preferved, after the revolutions of 12 centuries, by the Indian, the African, and the Turkifh profelytes of the Koran."—The Turkifh dome of St. Sophia, with an increafe of fplendour and fize, reprefents the humble tabernacle erected at Medina by the hands of Mahomet. The Mahometans have uniformly withftood the temptation of reducing the object of their faith and devotion to a level with the fenfes and imagination of man. "I believe in one God, and Mahomet the apoftle of God," is the fimple and invariable profeffion of Iflam. The intellectual image of the Deity has never been degraded by any vifible idol, &c. "From the Atlantic to the Ganges, the Koran is acknowledged as the fundamental code, not only of theology but of civil and criminal jurifprudence; and the laws which regulate the actions and the property of mankind are guarded by the infallible and immutable fanction of the will of God."

In a review of the caufes which feem to have facilitated the original fuccefs of Mahometanifm, profeffor White (Sermons,

(Sermons, ii.) traces them in the ſcandalous diviſions and deplorable corruptions of the Chriſtian church; in the political and religious ſtate of Arabia; in the independence and want of union among its tribes; in the groſs ignorance (particularly with regard to religion) of its barbarous and uncivilized inhabitants; and, laſtly, in the nature and genius of Mahometaniſm itſelf; in the faſcinating allurements of its promiſed rewards, in their agreeableneſs to the propenſities of corrupt nature in general, and to thoſe of the inhabitants of warmer climates in particular; in the artful accommodation of its doctrines and its rites to the preconceived opinions, the favourite paſſions, and the deep-rooted prejudices of thoſe to whom it was addreſſed; in the poetic elegance with which its doctrines, its precepts, and its hiſtories were adorned, and in the captivating manner in which they were delivered. As the corrupt and diſtracted ſtate of the Chriſtian church had originally aſſiſted the riſe, ſo did it operate with ſtill greater force in favour of the ſubſequent progreſs of Mahometan impoſture. If, indeed, we allow to this cauſe its proper influence; if we conſider the weakneſs of the ſurrounding nations, and the natural ſtrength of Arabia, now collected and pointed to one object; if we reflect on that fervour of zeal, and that wildneſs of enthuſiaſm, which were now ſuperadded to the native valour of a hardy and warlike people; we ſhall ceaſe to wonder at the victories and triumphs they obtained over the lukewarm and degenerate defenders of the goſpel. Of theſe victories and theſe triumphs, the propagation of their new faith was the profeſſed object and deſign: thus, by violence and bloodſhed had the prophet himſelf finally eſtabliſhed his religion among his countrymen; and thus had he expreſsly commanded his followers to extend it over all the regions of the earth. Of the continuance of Mahometaniſm, when thus eſtabliſhed, and of its exiſtence to the preſent times, various cauſes might be aſſigned, whoſe joint operation would be ſufficient to account fully for the effect, without having recourſe to any miraculous or particular interpoſition of providence. Of theſe cauſes we ſhall ſatisfy ourſelves with mentioning only one, which appears to be of peculiar force and importance. In almoſt all thoſe countries, which acknowledge the authority of Mahomet, ſo intimate is the connection, ſo abſolute the dependence of the civil government on religion, that any change in the latter muſt neceſſarily and inevitably involve the ruin and overthrow of the former. The Koran is not, like the goſpel, to be conſidered merely as the ſtandard by which the religious opinions, the worſhip, and the practice of its followers are regulated; but it is a political ſyſtem; on this foundation the throne itſelf is erected; from hence every law of the ſtate is derived; and by this authority every queſtion of life and of property is finally decided. It is obvious, therefore, that in every country where Mahometaniſm had been once received and eſtabliſhed, the circumſtance now mentioned muſt have operated with uncommon weight to cruſh any important innovation in religion; ſince from this inſeparable connection between the ſanctions of religion and thoſe of the ſtate, every ſuch innovation would be conſidered in no other light, than as an attempt to overturn the civil government, to looſen the bands of ſociety, and to deſtroy every privilege of law, and every ſecurity of property.

Mahomet was ſucceeded by Abubeker, agreeably to the wiſhes of the deceaſed prophet; who, after a reign of two years, was followed by Omar; and in the 12th year of his government, he received a mortal wound from the hand of an aſſaſſin, and made way for the ſucceſſion of Othman, the ſecretary of Mahomet. After the third Caliph, 24 years after the death of the prophet, Ali was inveſted, by the popular choice, with the regal and ſacerdotal office. Among the numerous biographers of Mahomet, we may reckon Abulfeda, Maracci, Savary, Sale, Prideaux, Boulainvilliers, D'Herbelot, Gagnier, Gibbon, and the author of the article in the Modern Univerſal Hiſtory. See ALCORAN and MAHOMETANISM.

MAHOMET I., ſultan of the Turks, born about the year 1374, was one of the ſons of Bajazet, who was dethroned by Tamerlane. After his brother Solyman had loſt his life in the war with Muſa, he declared himſelf his avenger, and being aſſiſted by the Greek emperor Manuel, defeated Muſa, who was killed in the field, or made captive and put to death by Mahomet's orders. The victor was proclaimed ſultan at Adrianople in 1413, which city he made the ſeat of his empire. Soon after his acceſſion, he paſſed over with an army into Leſſer Aſia, and did much miſchief there. After having ſubdued Servia, part of Sclavonia, and Macedonia, and reduced to obedience the provinces of Leſſer Aſia, he died in the year 1421, having reigned eight years with diſcretion and ſucceſs, and leaving behind him a character reſpectable for juſtice and clemency. Univer. Hiſt. Gibbon.

MAHOMET II., emperor of the Turks, named "The Great," and "The Victorious," ſon of ſultan Amurath, or Morad II., was born at Adrianople in 1430, and received an education very ſuperior to that generally beſtowed on the princes of the Turkiſh empire. He was well ſkilled in five languages, and was converſant in hiſtory and geography. During the life of his father, he twice aſſumed the ſovereignty, and twice relinquiſhed it, at the command of his parent. He made no oppoſition to his father's will, but never forgave the miniſters who were the adviſers of the meaſure. One of his firſt acts, after the death of his father, was the ſiege of Conſtantinople, which commenced in the ſpring of 1453; he cauſed cannon of a prodigious ſize to be caſt, and aſſembled a vaſt army from all parts of his dominions, with a great fleet. He ſuperintended the operations himſelf, and by a ſeverity that puniſhed the ſmalleſt diſobedience with death, and the moſt magnificent promiſes of reward, he ſtimulated the exertions of his troops. The vaſt diſparity of force between the aſſailants and defenders, leaves little room for admiring the military ſkill and proweſs of the victorious party. The ſultan, reſolved to carry his point, let it coſt what it would, drove on his men to the attack, and it was by numbers that the final ſucceſs was obtained. (See CONSTANTINOPLE.) It was on the twenty-ninth of May 1453, that the general aſſault was made which determined the fate of that city. After a gallant reſiſtance with his few faithful followers, the laſt Greek emperor loſt his life in the preſs, and the Turks burſt into the city through the breaches of the walls. Mahomet ſullied his victory by the moſt brutal conduct, but as he determined to fix the ſeat of his empire in this admirable ſituation, he repaired and repeopled the city partly from his own ſubjects, and partly from the fugitive Greeks, to whom he allowed the free exerciſe of their religion. The great church of Santa Sophia was converted into a moſque, and the creſcent took place of the croſs, in this ſecond capital of Chriſtendom. After the event, the weſtern writers give Mahomet the title of emperor of the Turks. Almoſt the whole reign of this monarch was ſpent in martial projects, which rendered him equally the terror of the Chriſtian world, and the pride of the Mahometan. His conqueſts were very numerous: he invaded Servia, and made it tributary; he took Mitylene, the ancient Leſbos, with the other iſlands, and reduced Boſnia under his dominion, which, however, was afterwards recovered by Matthias, king of Hungary.

He fubdued Caramania, the fovereigns of which had long been the moft inveterate enemies of the Turkifh fultans. He conquered Negropont, the ancient Eubœa, and wrefted Kaffa in Crim Tartary from the Genoefe. One of his lateft attempts was the fiege of Rhodes, in which he was rendered unfuccefsful by the valour of the knights. He, however, as a compenfation for this difafter, captured Otranto in Italy, which gave him a footing in that country; but to him this was of little ufe; his end was haftily approaching; he died in the month of May 1481, at the age of fifty-one, after a reign of thirty years. The vigour of mind and body, and the loftinefs of enterprize by which this conqueror was characterifed, raife him vaftly above the mere poffeffors of an hereditary throne. His fucceffes, however, were chiefly obtained by the force of numbers, urged on by an unfeeling defpotifm, and it has been afferted that he generally failed in the conteft with combined fkill and valour. The evils which he brought upon Chriftendom have caufed his moral qualities to be painted in the darkeft colours by its writers. He has been accufed of irreligion, perhaps chiefly from the tolerant fpirit which directed his conduct towards the vanquifhed of different religions; yet he difplayed the ufual zeal of princes in founding fplendid edifices for the public worfhip of the eftablifhed faith. Univer. Hift. Gibbon.

Mahomet III., emperor of the Turks, fon of Amurath III., was born in 1564, and fucceeded to the throne on the death of his father in 1596. The firft act of his infamous reign was the murder of nineteen brothers, and of ten of his father's wives from whom offspring might be apprehended. Having thus fecured his throne, he gave himfelf up to indolence and fenfuality, little attentive to the affairs of the empire, which were feldom more unprofperous than in this reign. In his contefts with neighbouring powers he was commonly unfuccefsful. A feries of difafters excited againft him a confpiracy, to quell which, he was under the neceffity of facrificing fome of his officers, and banifhing the queen mother from his counfels. Mahomet died in 1603, at the age of thirty-nine, after an inglorious reign of about eight years.

Mahomet IV., emperor of the Turks, was born in 1642, and fucceeded his depofed father Ibrahim in 1649. During his minority the government was adminiftered by his mother, affifted by a council of bafhaws. He found his country at war with the Venetians, which was continued with various fuccefs. The empire at home was convulfed by the revolt of the bafhaw of Aleppo, who at firft gained great advantages over the grand vizier, but in the end loft his life. In the year 1660, war was rekindled with great vigour in Hungary, and the Turkifh arms were at firft fuccefsful. A great victory gained by Montecuculi, the imperial general at Raab, in 1664, inclined the Ottoman court to a peace, which was foon after concluded. The conqueft of the ifland of Candia from the Venetians in 1669, after a fiege of 25 years, was one of the moft memorable events of this reign. A war with Poland in 1672, was terminated with a peace very humiliating to the Poles, but the nation refufed to ratify it, and John Sobiefki in the following year gave the Turks a complete defeat at Choczim, which circumftance was the means of raifing him to the Polifh throne. After this, for feveral years, the tide fet in ftrongly againft the Turks. A career of ill fortune excited difcontents among them, and the army broke out into a fierce mutiny. Quitting their camp near Belgrade, they marched for Conftantinople, and fent before them a demand of the grand vizier's head; which was granted. They next upbraided the fultan with his neglect of public affairs, and entreated him to refign a government which he had proved himfelf unfit to conduct. Mahomet, as a meafure of felf-defence, determined to put his brothers to death, but being apprifed of his intention, they took methods of faving themfelves from the threatened danger. At length Mahomet fubmitted to pronounce the decree of his own refignation. He quitted the throne in 1687, and was confined to his apartment, where he furvived till the year 1691. He left two fons, who afterwards came to the throne of the empire. Mahomet IV. is defcribed as diftinguifhed for juftice, clemency, and valour, though the hiftory of his reign is that of his generals and minifters; his own activity was fhewn chiefly, if not wholly, in the purfuits of the chace. Univer. Hift.

Mahomet *Pigeon*, in *Ornithology*, the common Englifh name of a fpecies of pigeon, called by Moore the *columba Numidica alba*. It is of the fame fhape and fize with the Barbary pigeon, and has all the characters of that fpecies, but is always perfectly white, which gives the red circle about the eyes a more lively look. See Columba.

MAHOMETANISM, Mahometism, or Mohammedism; the fyftem of religion broached by Mahomet, and ftill adhered to by his followers. See Mahomet.

Mahometanifm is embraced by the Turks, Perfians, and feveral nations among the Africans, and many among the Eaft Indians.

Brerewood fays, that if we divide the known countries of the earth into thirty equal parts five of them are Chriftians, fix Mahometan, and nineteen Pagan.

The fyftem of Mahometanifm is contained in the Koran, commonly called the *Alcoran;* which fee.

The firft and chief article of the Mahometan creed is, that *there is no other God but one God;* which they have from the Koran, where thefe words are repeated inceffantly: *there is no other God but he. Your God is the only God. I am God, and there is no other God but I.* This grand axiom of their theology feems to have been taken from the Jews, who were continually rehearfing thofe words of Deuteronomy, *Hear, O Ifrael; the Lord our God is One.*

For this reafon, the Mahometans account all fuch as own any thing of number in the divinity, to be infidels or idolaters. And accordingly, one of the firft leffons they teach their children is, that God is neither male nor female, and, confequently, can have no children. (See the 2d, 57th, and 58th chapters of the Koran.) Hence, the profelytes of Mahomet, from India to Morocco, are diftinguifhed by the name of "Unitarians;" and the danger of idolatry has been prevented by the interdiction of images.

The fecond article of Mahometanifm confifts in this, *that Mahomet was fent from God.* By which they exclude all other religions; under pretence that their prophet was the laft and greateft of all the prophets that God would ever fend, and that as the Jewifh religion ceafed with the coming of the Meffiah, fo likewife the Chriftian religion was to be abrogated with the coming of Mahomet. Not but they own Mofes and Jefus Chrift to have been great prophets; but Mahomet they hold to be "The Prophet," by way of excellence, commiffioned to purge the holy fcriptures of the Old and New Teftament, which they allow, from the corruption introduced in them by Jews and Chriftians, and to reftore the law of God to its original purity; and the paraclete or comforter promifed in the fcriptures.

The Mahometans call their religion *Iflam*, denoting, as fome fay, *refignation* or *fubmiffion* to the fervice and commands of God; but, according to others, formed from the root *falama*, fignifying to *be faved*, and, therefore, the fame with the *religion* or *ftate of falvation;* and they divide it into two diftinct parts, *viz. iman*, i. e. *faith* or *theory;* and *din*,

i. e. *religion* or *practice:* and teach that it is built on five fundamental points, one belonging to faith and the other four to practice.

Under the confession of faith already recited, they comprehend six distinct branches, *viz.* belief in God; in his angels; in his scriptures; in his prophets; in the resurrection and day of judgment; and in God's absolute decree and predetermination both of good and evil. The four points relating to practice, are prayer, under which are comprehended those washings or purifications which are necessary preparations required before prayer; alms, fasting, and the pilgrimage to Mecca. Their faith in God has been already mentioned: with respect to their opinion of angels, they believe them to have pure and subtile bodies, created of fire, and that they are differently employed, in writing down the actions of men, or in carrying the throne of God, and other services. The four angels, whom they regard as most distinguished by God's favour, and on account of the offices assigned them, are Gabriel, called the holy spirit, and the angel of revelations, and supposed to be honoured with the peculiar confidence of God, and employed in writing down the divine decrees; Michael, the friend and protector of the Jews; Azrael, the angel of death, who separates men's souls from their bodies; and Israfil, whose office it will be to sound the trumpet at the resurrection. They also believe that two guardian angels, changed every day, attend on every man, to observe and write down his actions. Their whole doctrine concerning angels they have borrowed from the Jews, who learned the names and offices of those beings from the Persians. The devil, called by Mahomet "Eblis," from his despair, was one of those angels, who are nearest to God's presence, called Azazil, and fell, according to the doctrine of the Koran, for refusing to pay homage to Adam at the command of God. They also admit an intermediate order of beings, called genii, some of which are good, and others bad; and capable of future salvation or condemnation, as men are, whence Mahomet pretended, that he was sent for the conversion of genii as well as of men.

As to the scriptures, the Mahometans are taught by the Koran, that God, in divers ages of the world, gave revelations of his will in writing to several prophets, the whole, and every word of which, it is absolutely necessary for every good Moslem to believe. Mahomet acknowledges the divine authority of the Pentateuch, Psalms, and Gospel, and often appeals to the consonancy of the Koran with those writings, and to the prophecies, which he pretended, were contained concerning himself, which the Jews and Christians have suppressed.

Besides these books, the Mahometans take notice of the writings of Daniel and several other prophets, and even cite them, but they do not believe them to be divine scripture, or of any authority in matters of religion. Among the prophets, in number 224,000 according to some, and 124,000 according to others, they reckon 313 apostles, bearing special commission to reclaim mankind from infidelity and superstition; six of whom were entrusted with new laws or dispensations, successively abrogating the preceding: these were Adam, Noah, Abraham, Moses, Jesus, and Mahomet.

At death, they maintain, that the bodies of those, who believe the unity of God, and the mission of Mahomet, rest in peace, and are refreshed with the air of paradise; otherwise they are grievously tormented. The souls of the former are conveyed to heaven, where a place is assigned them according to their merit and degree; those of the wicked are tormented, till they are rejoined to their bodies at the resurrection; the approach of which will be known by certain signs that precede it: these are the lesser and the greater signs: the latter of which are the sun's rising in the west; the appearance of a monstrous beast, which shall rise out of the earth in the temple of Mecca; war with the Greeks and the taking of Constantinople; the coming of Anti-Christ; the descent of Jesus on earth; war with the Jews; the eruption of Gog and Magog; a smoke which shall fill the whole earth; an eclipse of the moon; the return of the Arabs to the worship of their ancient idols; the discovery of a vast heap of gold and silver by the retreat of the Euphrates; the demolition of the temple of Mecca by the Ethiopians; the speaking of beasts and inanimate things; the breaking out of fire in the province of Hejaz or Yemen; the appearance of a man, who shall drive men before him with his staff; the advent of the Mohdi, or director, a person of the family of Mahomet, to govern the Arabians, and fill the world with righteousness; and a wind that shall sweep away the souls of all who have but a grain of faith in their hearts. But the immediate sign of the resurrection will be the first blast of the trumpet, which will be sounded three times. The day of judgment will continue, as the Koran says in one place, 1000 years, but according to another passage, 50,000 years: the resurrection, say they, will be general, extended to all creatures, angels, genii, men, and animals; who will be assembled on the earth, give an account of their actions, and receive retribution. On this occasion each person will have the book, wherein all the actions of his life are written, delivered to him, and their works will be weighed in a balance, which they minutely describe. When the examination is finished mutual retaliation will follow; which will be executed by taking away a proportionable part of the good works of him who offered injury to another, and adding it to him who suffered it. Brutes will be changed into dust; and the believing genii be assigned a place near the confines of paradise, and the unbelieving punished eternally and cast into hell, with the infidels of mortal race. After this process, the good and wicked are conducted to a bridge, called Alsirat; over which the former shall safely pass, while Mahomet and his Moslems lead the way, but the latter will fall down headlong into hell; where there are seven different apartments, adapted to as many distinct classes of the damned, who will suffer both from intense heat and excessive cold. In this state infidels only will be liable to eternal punishment; but the Moslems or believers will be delivered thence, after they have expiated their crimes by their sufferings. This place of punishment is separated from paradise by a wall, called "Al draf," so small in breadth as to admit the blessed and damned to converse together. The righteous, after having passed the bridge above-mentioned, will be refreshed by drinking at the pond of their prophet, and then admitted into paradise, situated in the seventh heaven, and next to the throne of God; where they will feed on the most delicious fruits, be clothed in the most splendid silken garments, refreshed with rivers of water, wine, milk, and honey, and entertained with the most delightful music, and the ravishing girls of paradise with black eyes, the enjoyment of whose company will be a principal felicity of the faithful.

It appears from the Koran, that women as well as men will not only be punished for their evil actions, but also receive the reward of their good deeds, and that both will enjoy a perpetual youth.

Hence it appears, that the vulgar opinion, which charges the Mahometans with maintaining that women have no souls, or if they have any, that they will perish like the

 brutes,

brutes, without any future recompence, is erroneous. It is, however, a general notion, that they will not be admitted into the fame abode as the men, becaufe their places will be fupplied by the paradifiacal females already mentioned. One circumftance relating to thefe beatified females, conformable to what Mahomet had afferted of the men, he acquainted his followers with in the reply which he made to an old woman; who defiring him to intercede with God, that fhe might be admitted into paradife, was told by him, that no old women would enter that place; which caufing the aged female to figh and fhed tears, he explained himfelf by faying, that God would then make her young again.

Farther, the orthodox doctrine with refpect to predeftination is, that every thing which happens in this world proceedeth entirely from the divine will, and is irrevocably fixed from all eternity in the preferved table; God having fecretly predetermined not only the adverfe and profperous fortune of every perfon in this world, in the moft minute particulars, but alfo his faith or infidelity, his obedience or difobedience, and confequently his everlafting happinefs or mifery after death; which fate or predeftination it is not poffible for any forefight or wifdom to avoid.

Of this doctrine Mahomet makes great ufe in his Koran for the advancement of his defigns, encouraging his followers to fight without fear, and even defperately, for the propagation of their faith, reprefenting to them that no caution on their part could avert their inevitable deftiny, or prolong their lives for a moment.

In regard to the four fundamental points of religious practice; Mahomet is faid to have declared, that the practice of religion is founded on cleanlinefs, which is one-half of the faith, and the key of prayer, without which it will not be heard by God. Such is the opinion which the Mahometans entertain of cleanlinefs, that it is purely on this account they feem to have adopted circumcifion, though it be not mentioned in the Koran. Mahomet has obliged his followers to pray five times every twenty-four hours, at certain ftated feafons, turning their faces towards the temple of Mecca, which is pointed to by a niche in their mofques: the life and fpirit of prayer, they hold, are the inward difpofition of the heart; nor do they ever perform this duty in fumptuous apparel, nor fuffer their women to attend them on thefe occafions, left their prefence fhould infpire a different kind of devotion from that which is requifite in a place dedicated to the worfhip of God.

Alms, among the Mahometans, are legal and voluntary; the giving of which is frequently inculcated in the Koran. Hafan, or Hofein, the fon of Ali, and grandfon of Mahomet, is faid to have thrice in his life divided his fubftance equally between himfelf and the poor, and twice to have given away all he had; and the generality of Mahometans are fo addicted to acts of benevolence, that they extend their charity even to brutes. Fafting is called by Mahomet the gate of religion; and his followers are exprefsly required to faft during the month of Ramadan; which they obferve by abftaining from meat, drink, and women, from day-break till fun-fet. Befides this, they have feveral other voluntary fafts. The pilgrimage to Mecca is fo neceffary a point of practice, that, according to a tradition of Mahomet, he who dies without performing it may as well die a Jew or a Chriftian; and it is exprefsly commanded in the Koran. The various ceremonies prefcribed to thofe who perform this pilgrimage are extremely abfurd and ridiculous, and appear to be relics of idolatrous fuperftition.

Befides the fundamental points of faith and practice above recited, the Mahometans are required by the Koran, to abftain from wine, gaming, ufury, divining by arrows, the eating of blood and fwine's flefh, and whatever dies of itfelf, or is flain in honour of any idol, or ftrangled, or killed by accident, or by any other beaft. The Koran allows polygamy within certain limits; forbidding any man to have more than four, whether wives or concubines: but Mahomet had the privilege of marrying as many wives, and keeping as many concubines as he pleafed. It allows alfo of divorce; but feverely punifhes fornication and adultery.

Wilful murder, though forbidden by the Koran under the fevereft penalties to be inflicted in the next life, is neverthelefs by the fame book allowed to be compounded for, on payment of a fine to the family of the deceafed, and freeing a Moflem from captivity; but this commutation depends on the choice of the next of kin, who may either accept or refufe it. Manflaughter was redeemed by fine, and the freeing of a captive; and if a man were not able to do this, he was required to faft two months together, by way of penance. The fine for a man's blood was fet in the "Sonna" at 100 camels, and was diftributed among the relations of the deceafed. Theft was ordered to be punifhed by cutting off the hand. As to injuries done to men in their perfons, the law of retaliation, which was ordained by the law of Mofes, is alfo approved by the Koran; but it was feldom executed; the punifhment being generally turned into a mulct or fine, paid to the party injured. In the punifhment of leffer crimes, not provided for by the Koran, the Mahometans have commonly recourfe to ftripes or drubbing, according to the ufual practice of the Eaft. Under the head of the civil laws of the Mahometans, we may comprehend the injunction of warring againft infidels, which is repeated in feveral paffages of the Koran, and declared to be very meritorious in the fight of God; thofe who are flain fighting in defence of the faith, being reckoned martyrs, and promifed immediate admiffion into paradife.

The months which the ancient Arabs held facred were al Moharram, Rajeb, Dhu'lkaada, and Dhu'lkaja, the 1ft, the 7th, the 11th, and the 12th in the year. Mahomet by the Koran confirmed the obfervance of thefe months.

The day of the week which Mahomet has fet apart for public worfhip is Friday; befides which they have two annual feafts called *Beiram*.

After the death of Mahomet, a fchifm arofe among his followers, which divided them into two great factions, whofe feparation not only gave rife to a variety of opinions and rites, but alfo excited the moft implacable hatred, and the moft deadly animofities. Of thefe factions the one acknowledged Abubeker, the father-in-law of Mahomet, as his fucceffor, or the true caliph, and its members were diftinguifhed by the name of *Sonnites*; while the other adhered to Ali, his fon-in-law, and were known by the title of *Schiites*. Both, however, adhered to the Koran as a divine law, and the rule of faith and manners; to which indeed the former added, by way of interpretation, the Sonna, *i. e.* a certain law, which they looked upon as defcended from Mahomet by oral tradition, and which the Schiites refufed to admit. Among the Sonnites we are to reckon the Turks, Tartars, Arabians, Africans, and the greateft part of the Indian Mahometans; whereas the Perfians, and the fubjects of the grand mogul, are generally confidered as the followers of Ali, though the latter indeed feem rather to obferve a ftrict neutrality in this conteft. Befides thefe two grand factions, there are other fubordinate fects among the Mahometans, which difpute with warmth concerning feveral points of religion, though without violating the rules of mutual toleration. Of thefe fects there are four, which far furpafs the reft in point of reputation and importance, *viz.* the Hanefites, the fect of Malec, the fect of Al Shafei, and that of Ebn Hanbal, which are

are called the orthodox Mahometans. Sale's Preliminary Discourse. See ALCORAN.

The rapid success which attended the propagation of this new religion, was owing to causes that are plain and evident, and must remove, or rather prevent, our surprise, when they are attentively considered. We have enumerated the principal under the biographical article MAHOMET. But the subject is of importance, and we shall therefore here resume it. The terror of Mahomet's arms, and the repeated victories which were gained by him and his successors, were, no doubt, the irresistible arguments that persuaded such multitudes to embrace his religion, and submit to his dominion. Besides, his law was artfully and marvelously adapted to the corrupt nature of man; and, in a more particular manner, to the manners and opinions of the eastern nations, and the vices to which they were naturally addicted: for the articles of faith which it proposed were few in number, and extremely simple; and the duties it required were neither many nor difficult, nor such as were incompatible with the empire of appetites and passions. It is to be observed farther, that the gross ignorance under which the Arabians, Syrians, Persians, and the greatest part of the eastern nations, laboured at this time, rendered many an easy prey to the artifice and eloquence of this bold adventurer. To these causes of the progress of Mahometanism, we may add the bitter dissentions and cruel animosities that reigned among the Christian sects, particularly the Greeks, Nestorians, Eutychians, and Monophysites; dissentions that filled a great part of the East with carnage, assassinations, and such detestable enormities, as rendered the very name of Christianity odious to many. We might add here that the Monophysites and Nestorians, full of resentment against the Greeks, from whom they had suffered the bitterest and most injurious treatment, assisted the Arabians in the conquest of several provinces, into which, of consequence, the religion of Mahomet was afterwards introduced. Other causes of the sudden progress of that religion will naturally occur to such as consider attentively its spirit and genius and the state of the world at this time. Mosheim's Eccl. Hist.

MAHON, in *Geography*. See PORT *Mahon*.

MAHON, a river of Ireland, in the county of Waterford, which runs into the sea; 11 miles E. of Dungarvan.

MAHONE BAY, a bay on the coast of Nova Scotia, separated from Margaret's bay by the promontory, on which is the high land of Aspotagoen.

MAHONING, a township of America, in Pennsylvania, situated on Susquehanna river.

MAHONOY, a township of Susquehanna river, in Pennsylvania, having 1102 inhabitants.

MAHONY, a town of Hindoostan, in the circar of Sohagepour; 20 miles N. of Sohagepour.

MAHOU, a city of China, of the first rank, in the province of Se-tchuen, seated on the Kincha; comprehending, within its district, only one city of the third class, but a place of great trade. N. lat. 28° 32'. E. long. 103° 51'.

MAHOWLY, a town of Hindoostan, in Oude; 29 miles N.W. of Kairabad.

MAHR, HANNA, a town of Syria, where the Greek Catholics have a convent and a printing-office; 18 miles N.E. of Bairout.

MAHRABUT. See MARABBUT.

MAHRAJEGUNGE, a town of Hindoostan, in Bahar; 11 miles E. of Hajypour.—Also, a town of Bengal; 30 miles N.E. of Purneah.—Also, a town of Hindoostan, 20 miles W. of Benares.

MAHRAS, EL, a town of Tunis; 60 miles S. of Cairoan.

MAHRATTAS, a powerful people of Hindoostan, who derived their name, as some say, from "Marhat," a province of the Deccan, mentioned by Ferishta, and comprehending Baglana, or Bogilana, and other districts, which at present form the most central part of the Mahratta dominions. The original meaning of the term Marhat is unknown; but there is no doubt that the name of the nation is a derivative from it; for we may depend upon the testimony of Ferishta, who wrote at a period, when the inhabitants of the province of Marhat did not exist as an independent nation; but were blended with the other subjected Hindoos of the Deccan. We learn also from an earlier authority than that of Ferishta, *viz.* from Nizam-ul-Deen, an officer in the court of Acbar, who wrote a general history of Hindoostan, brought down to the 40th year of that emperor, that one of the kings of Delhi made an excursion from Deogur, or Dowlatabad, into the neighbouring province of "Marhat." This relation occurs also in Ferishta's history of Hindoostan. It was in the reign of Alla I. A.D. 1312. From a paper published in the "Asiatic Researches," (vol. ix.) we learn that it is asserted in India, that the "Mahrattas" are foreigners, and that they acknowledge this to be their origin. A tribe called Ranas, related to the Mahrattas, say, that they are descended from Nushirvan; and the Parsis, in India, fix the time of their emigration in the reign of Abu-Becr, which lasted only two years, in 632 and 633. Some of these emigrants left Persia at different periods, in consequence of the fanatic zeal of the Mussulmen, and their persecuting spirit; but the emigration of the children of Nushirvan is the most ancient. Of these emigrants, some retained their ancient religion, and are called Parsis; others termed Hindûs, and are called Ranas and Mahrattas. The Mahrattas are called "Maha-Rashtras" in Sanscrit: "Maha" is great and illustrious, and "Rasht-ra," synonymous with Raja-putra, implies their royal descent; and their name also indicates, that they were acknowledged to belong to the second class on their arrival in India, and of course that they were not Brahmans. When the new adventurers obtained power and influence, they assumed the title of Maha-Rashtras, and by striking out such letters as became useless, when brought to the standards of the dialects in use, they acquired the name of Maha rata, Mahrata, and Mahretor. The founder of the Mahratta empire may be considered as Sevajee, who was born in 1628, and disdaining the condition of a subject, embraced an early opportunity of becoming independent. The progress of his conquests was so rapid, that he became formidable to the armies of the Mogul empire, before Aurungzebe's accession to power; having seized on the principal part of the province of Baglana, and the country of Concan, situated between it and the western sea. He had also taken possession of other places of strength. In the Carnatic he had possession of Gingee, together with an extensive district round it; and this, perhaps, may be regarded rather as an usurpation of one of the Visiapour conquests, than as an acquisition made from the original sovereign of the Carnatic; for the king of Visiapour appears to have possessed the southern part of the Carnatic, including Tanjore. At the death of Sevajee, in 1680, his domains extended from the northern part of Baglana, near Surat, to the neighbourhood of the Portuguese districts of Goa, along the sea-coast. His conquests had been the fruits of hardy and persevering valour; partly acquired in despite of Aurungzebe, then in the zenith of his power. Sevajee had also plundered Surat and Golconda, and even attacked Goa, when the Portuguese power was at its height. His son Sambajee fell a sacrifice to his debauchery, having been seized on treacherously, in one of his licentious excursions, and cruelly put to death by Aurungzebe in 1689. The Mahrattas, however, remained unsubdued, and increasing in power. Sahoo, or Sahoojee, succeeded his father Sambajee, at a very early age; and as he inherited the ability and vigour of mind of his immediate ancestors, and reigned more than fifty years, during a period favourable to the aggrandizement of a rising state, the Mahratta power grew up to the wonderful height at which we have beheld it. The confusions occasioned by the disputed succession among Aurungzebe's sons, and their descendants, opened a wide field to all adventurers; and particularly to those hardy and enterprising people, who had contended even with Aurungzebe himself; and it would be matter of surprise that Sahoojee made so many conquests, if we did not consider that Hindoostan abounds with military adventurers, who readily enlist themselves under a chief, who holds out to his followers a prospect of plunder. At the time of Sahoojee's death, in 1740, the Mahratta state had swallowed up the whole tract from the Western sea to Orissa, and from Agra to the Carnatic; and almost the remaining portion of Hindoostan, Bengal excepted, had been over-run and plundered. It is difficult to trace the Mahratta conquests, according to the order of time in which they were made.

It is known that they took part in the disputes between the descendants of Aurungzebe at Delhi, as early as the year 1718; but it was not till the year 1735, that they were sufficiently powerful to demand a tribute from the emperor, Mahomed Shah. This terminated in their acquisition of the greatest part of the province of Malwa; and in a grant of the fourth part of the nett revenues of the other provinces in general. This proportion being denominated in the language of Hindoostan a "Chout," the subsequent demands of the Mahrattas were thus called, though they are not limited to that proportion. About the year 1736, they took part in the disputes between the nabobs of Arcot, in the Carnatic; and as the principal European settlements, on the coast of Coromandel, are situated within this district, these disputes eventually engaged the French and English East India Companies in scenes of hostility for several years. Sahoojee was succeeded, in 1740, by Ram Rajah, who was a weak prince; and it happened in the Mahratta state, as in other states of recent formation, and rapid growth, that what was gained by the ability of one despot was lost by the imbecility of another. The two principal officers of the state, the "Paishwah," or minister, and the "Bukshi," or commander in chief, agreed to divide the dominions of their master; the former assuming the government of the western provinces and continuing at Poonah, the ancient capital, and the latter occupying the eastern provinces and residing at Nagpour, in Berar. This violent usurpation of the empire by its ministers, encouraged the usurpations of others, according to their respective degree of power, and their opportunity; so that, in the course of a few years, the state, from being an absolute monarchy, became a mere confederacy of chiefs, exhibiting the most disjointed example of feudal government in the world. In 1742, and 1743, both the Mahratta states, for reasons which we shall not here recite, invaded Bengal, with armies said to contain 80,000 horsemen each. But as they acted without union, and Aliverdy had recourse to bribery, and to other means for creating a dissention between them, the inhabitants of Bengal, though great sufferers, were not injured to the degree which they were led to expect. The Mahrattas did not retire from the provinces till the year 1744, when they had collected a vast mass of plunder and established the claim of the "Chout," which, however, was never regularly paid. The Berar Mahrattas having afterwards obtained possession of the Orissa province, their proximity to Bengal afforded them frequent opportunities of plundering the frontier provinces; and it was not till the year 1761, when Cossim Ally, nabob of Bengal, ceded the provinces of Burdwan and Midnapour to the English, that the Mahrattas ceased to plunder them. Bajirow, who had taken possession of the Western provinces, wrested from the Portuguese the fortress of Basseen, and the island of Salsette, near Bombay, which were inferior in importance only to Goa. He died in 1759, and left the paishwahship, now considered as an hereditary establishment, to his son Ballajée. At this period the Mahrattas pushed their conquests into the Panjab, and even to the banks of the Indus. But their prosperity was of no long duration. The wars that ensued between them and Abdalla of Candahar, and which terminated with the famous battle of Pannipat, the most obstinate and bloody in the records of Hindoostan, decided the pretensions of the Mahrattas with regard to universal empire in Hindoostan, to which they were aspiring, for in this battle they lost the flower of their army, and their best generals; and from that period, *viz.* 1761, their power has been sensibly on the decline. Ballajée died soon after, and was succeeded by his son Maderow, who died in 1772. The son and successor of Maderow was murdered, in 1773, by his uncle Ragobah; by which act he excited general resentment and detestation; so that, needing allies to support his ill-gotten power, he made an advantageous treaty with the English, in order to secure the Bombay government in his cause; the consequence of this treaty was the commencement of hostilities both by sea and land, and the island of Salsette, a most desirable acquisition, was taken possession of by the English. A subsequent war between the English and the Mahrattas was attended with the conquest, on the part of the former, of the finest parts of Guzerat and the Concan, including the fortresses of Basseen and Amedabad; and, in short, of the whole country from Amenabad to the river Penn, and inland, to the foot of the Gauts; and on the side of Oude, the province of Gohud and other districts, together with the celebrated fortress of Gwalior, were reduced; and the war was carried into the heart of Malwa. This war was attended with an enormous expence, and a contest broke out with Hyder Ally in 1780, and therefore, in 1782 and 1783 a peace was negotiated and concluded between the English and the Mahrattas; and all the acquisitions made during the war were given up except Salsette, and the small islands situated within the gulf formed by Bombay, Salsette, and the continent. The eastern Mahratta state, or that of Berar, though preserved from foreign wars, has had its share of intestine broils. It is not likely, says major Rennell, that either of the Mahratta states will soon become formidable to the other powers of Hindoostan. The eastern state has not resources for it, and as for the western, it is so divided between different chiefs, that it will not be easy for one of them to gain such an ascendancy as to reunite its divided power. These Mahratta states, the western and eastern, collectively, occupy all the southern part of Hindoostan proper; together with a large proportion of the Deccan, Malwa, Orissa, Candeish, and Visiapour; the principal parts of Berar, Guzerat, and Agimere; and a small part of Dowlatabad, Agra, and Allahabad, are comprised

within

within their extenſive empire, which extends from ſea to ſea, acroſs the wideſt part of the peninſula; and from the confines of Agra northward, to the Kiſtnah ſouthward; forming a tract of about one thouſand Britiſh miles long, by ſeven hundred wide. To the weſtern ſtate, which is divided among a number of chiefs or princes, whoſe obedience to the paiſhwah, or head, reſembles that of the German princes to the emperor, being merely nominal, and whoſe confederacy never takes place except for mutual defence, belong ſeveral "jaghiredars," or holders of "jaghires," one on the north of Poonah, and two on the ſouth. The revenue of this ſtate is not eaſily aſcertained; but it has been ſtated by a native of India at 12 crores of rupees, or 12 millions ſterling; and the net receipts, jaghires deducted, at five crores. The ſame account makes the military eſtabliſhment in the field to be 200.000 troops, foot and horſe; beſides an equal number in garriſon. Another account of the revenue reckons ſeven crores for the net revenue. Major Rennell obſerves that if the provinces poſſeſſed by this ſtate were to be rated in the ſame proportion as in the time of Aurungzebe, the net revenue would be about eight crores of rupees, or eight millions ſterling. The moſt powerful jaghiredar within this ſtate is that of Sindia, who, ſince the Mahratta peace in 1783, has extended his frontier from Malwa towards the Jumnah, occupying moſt of the petty ſtates that heretofore exiſted there, and particularly that of Gohud. He alſo extended his arms ſouthward to Delhi, and into the provinces of Mewat and Jyenagur; reducing many fortreſſes and a conſiderable tract of country, which had been before poſſeſſed by the Jats and Nudjaff Cawn. The revenue of his paternal, or original dominions, in Malwa, &c. has been eſtimated at one crore of rupees *per annum*. Among his new acquiſitions, Gohud is eſtimated at 20 or 30 lacks *per annum*; Holkar has been ſuppoſed to poſſeſs 80 lacks *per annum* in his ſhare of Malwa. Sindia's capital city is Ougein, and Holkar's capital is Indore, about 20 coſſes S. or S.E. of Ougein. For an account of Berar, ſee Berar; and for further particulars relating to the Mahratta ſtates, ſee Hindoostan. Rennell's Introduction to his Memoir, paſſim, and his Map.

MAHRAUZEDURGAM, a town of Hindooſtan, in Myſore; ſix miles N.N.E. of Kiſtnagheri.

MAHRENBERG, or Marenberg, a town of the duchy of Stiria; nine miles N. of Windiſch Gratz.

MAHSENA, in *Ichthyology*. See Sciæna.

MAHU, in *Geography*, a town of Sweden, in Sudermanland; 28 miles N.W. of Nykioping.

MAHUDGEE, a town of Hindooſtan, in Oude; 12 miles N. of Fyzabad.

MAHUDWAH, a town of Hindooſtan, in Guzerat; 31 miles S.E. of Puttan Sumnaut.

MAHUR, a circar of Hindooſtan, in Berar, on the N. ſide of the Godavery river, E. of Ellichpour, and N. of Tellingana. The chief towns are Mahur and Neermul.—Alſo, a town, the capital of the above circar, 112 miles E. of Ellichpour. N. lat. 19° 24′. E. long. 78° 3′.—Alſo, a town of Hindooſtan, in the circar of Gurrah; 90 miles S.S.W. of Allahabad. N. lat. 24° 18′. E. long. 81° 2′.

MAHUREA, of Aublet and Juſſieu, in *Botany*. See Bonnetia.

MAHURRY, in *Geography*, a town of Hindooſtan, in the circar of Surgooja; 35 miles N.W. of Surgooja.

MAI, a town of Perſia, in the province of Lariſtan; 4– miles W. of Lar.

MAIA, a river of Ruſſia, which, riſing in N. lat. 59° 50′. E. long. 139° 10′, purſues a S.W. courſe to N. lat. 57° 40′, and then uniting with the Maimakan, changes its courſe to N.N.W. and runs into the Aldan, N. lat. 60° 20′. E. long. 133° 40′.

MAJA, in *Ornithology*, the name of a bird deſcribed by Nieremberg as very common in the iſland of Cuba, and frequenting the fields of rice in large flocks. It is deſcribed to be a ſmall bird of a yellowiſh colour, very delicate, and well taſted, and remarkable for having a ſtomach on the back or outſide of the neck. See Fringilla *Maja*.

Maja, or *Majan* of Buffon, a ſpecies of *Loxia*; which ſee.

MAIAGUE, the name of a Braſilian bird of the web-footed kind, but having its hinder toe looſe. It is of the ſize of the common gooſe; its head is large and round; its neck long, and it always carries it crooked like a ſwan; its beak is ſtrong and hooked at the end; it is all over of a browniſh-black colour, except that its throat is yellow. It is found about the mouths of rivers, and feeds on fiſh; it builds on the ground; it is very nimble in running, flying, and diving, and is not eaſily taken, but is a very well-taſted fowl. It is the Braſilian *petrel* of Latham. See Procellaria *Braſiliana*.

MAIAK, in *Geography*, an oſtrog of Ruſſia, on the coaſt of the Frozen ocean. N. lat. 71° 16′. E. long. 169° 14′.

MAIAKAR, a town of Ruſſia, in the government of Perm; 16 miles N. of Obrinſk.

MAIAN, a town of Perſia, in Farſiſtan; 18 miles S. of Iſpahan.

MAJANAH, a town of Algiers, in the province of Conſtantina, at the entrance of an extenſive plain, to which it gives name; 50 miles S.S.W. of Boojeiah.

MAIANTHEMUM, in *Botany*, from Μαιος, *the month of May*, and ανθεμον, *a flower*, a name given by ſome authors to the Lily of the Valley. See Convallaria.

MAIAR, in *Geography*, a town of Perſia, in Chuſiſtan; 12 miles N. of Kostha.

MAJARES, a town of Tranſylvania, in the Maros; 17 miles E. of Biſtricz.

MAIDA, a town of Naples, in Calabria Ultra; 9 miles W.N.W. of Squillace.

MAIDEN, an edged inſtrument uſed in ſome countries, and formerly in Scotland, for the beheading of criminals.

The maiden is a broad piece of iron, of a foot ſquare, ſharp on the lower part, and loaded above with lead, ſo as ſcarcely to be lifted: at the time of execution, it is pulled up to the top of a narrow wooden frame ten feet high, with a groove on each ſide for the maiden to ſlide in. The priſoner's neck being faſtened to a bar underneath, on a ſign given, the maiden is let looſe, and the head in an inſtant ſeparated from the body. It has been lately much uſed in France as an inſtrument of decollation, under the name of *Guillotine*.

Maiden is alſo the name of a machine firſt uſed in Yorkſhire, and ſince introduced into other places, for waſhing of linen; conſiſting of a tub nineteen inches high, and twenty-ſeven in diameter at the top, in which the linen is put, with hot water and ſoap, to which is adapted a cover, fitting it very cloſely, and faſtened to the tub by two wedges; through a hole in the middle of the cover paſſes an upright piece of wood, kept at a proper height by a peg above, and furniſhed with two handles, by which it is turned backward and forward: to the lower end of this upright piece is faſtened a round piece of wood, in which are fixed ſeveral pieces, like cogs of a wheel. The operation of this machine is to make the linen paſs and repaſs quick through the water. Gent. Mag. vol. xxii. p. 32.

Maiden-

Maiden-*Affizes*, are thofe where no perfon is condemned to die.

Maiden-*Hair*, *Adiantum*, in *Botany* and *Medicine*. See Adiantum, and Asplenium.

Maiden-*Hair*, *Black*, a name fometimes given to the dwarf-fern. See Asplenium.

Maiden-*Hair*, *Englifh*. See Trichomanes, and Asplenium.

Maiden-*Hair*, *White*, or *Wall-Rue*. See Asplenium.

Maiden *Islands*, in *Geography*, a clufter of fmall iflands in Five Ifland harbour, near the W. coaft of the ifland of Antigua.

Maiden *Paps*, a mountain of Scotland, in the county of Roxburgh: 8 miles from Havick.

Maiden *Plum*, in *Botany*. See Plum.

Maiden-*Rents*, in our *Old Writers*, a noble paid by the tenants of fome manors on their marriage. This was faid to be given to the lord, for his omitting the cuftom of marcheta, whereby he was to have the firft night's lodging with his tenant's wife; but it feems more probable to have been a fine for a licence to marry a daughter.

Maiden *Rocks*, in *Geography*, a chain of rocks in the Eaft Indian fea, near the N. coaft of the ifland of Java. S. lat. 7° 38'. E. long. 114° 36'.

MAIDENHEAD, anciently called *South Ealington*, a market-town in the hundred of Cookham, Berkfhire, England, is fituated 26 miles from London, on the borders of the Thames, in the parifhes of Bray and Cookham. It confifts principally of one long paved ftreet; and derives its chief importance from the bridge, by means of which the great weftern road was carried through the town. Previoufly the road paffed through Burnham, and travellers ufually croffed the river at a ferry called Babham's End, about two miles north of Maidenhead. The original bridge, which was of wood, Camden fays, was erected about the year 1400; but there is fufficient evidence of its being of greater antiquity, and that, in 1297, it had been built long enough to need repair; for which purpofe, a toll for three years was then granted. The prefent bridge, which is a work of confiderable merit, was conftructed from the defigns of fir Robert Taylor; and its foundation was laid in 1772. It confifts of feven large femi-circular arches of ftone, and three fmaller, at each end, of brick. The expence of building it was 19,000*l.*, independent of fome contiguous lands, which were purchafed to render the work complete. The approach to this ftructure is grand and fpacious, the ends being formed with curves outwards: along the fides is a broad pavement, fenced with a baluftrade. Maidenhead was originally incorporated in the 26th year of Edward III., under the name of the guild or fraternity of the brethren and fifters of Maydeneth, or Maidenhithe. After the Reformation, a frefh incorporation was granted, in the name of the warden and burgeffes of Maidenhead. King James II. granted another charter with the ftyle of mayor, bridge-mafters, and burgeffes, who are empowered to choofe a high-fteward. Two of the burgeffes, who are eleven in number, are annually elected bridge-mafters. The high-fteward, the recorder, the mayor, and his immediate predeceffor, are juftices of the peace. The mayor is clerk of the market, coroner, and judge of a court, which is held once in three weeks. The market, which was granted in 1452, is ftill kept on Wednefdays, and is a confiderable mart for corn. Here are three annual fairs. The revenues of the corporation confift chiefly of the tolls of the market and bridge. The principal trade of the town is in malt, meal, and timber; and the inhabitants derive additional affiftance from the continual paffage of travellers, for whofe accommodation feveral inns have been opened. In that part of the town which lies within the parifh of Cookham is a chapel, exempt from epifcopal jurifdiction; the minifter is appointed by the mayor and bridge-mafters. In this divifion of the town is alfo an alms-houfe for eight poor men and their wives, founded and endowed in 1659, by James Smith, efq. citizen of London. The number of inhabitants in Maidenhead, as returned to parliament in 1801, was 949, occupying 160 houfes: but either fome miftake was made in that enumeration, or the population has been rapidly on the increafe, for, in the year 1806, it amounted to 1100. At the eaftern extremity of the town is a large brick manfion, the feat of fir Ifaac Pocock, bart. Lyfons's Magna Britannia, vol. i. 4to. 1806.

Maidenhead, a fmall neat village of America, in Hunterton county, New Jerfey, fituated on the road between Princeton and Trenton; 6 miles from each, and having a Prefbyterian church: the townfhip contained, in 1790, 1032 inhabitants.

MAIDEN-LAND, a name given by fir Richard Hawkins, in 1594, to land which he difcovered in fteering towards the ftraits of Magellan, in honour of queen Elizabeth, and which, as he fays, lies "fome three-fcore leagues from the neareft part of South America." This land was afterwards found to be two large iflands by captain John Strong, of the Farewell, from London, who, in 1689, paffed through the ftrait which divides the eaftern from the weftern of thofe iflands. To this ftrait he gave the name of Falkland's Sound, in honour of his patron, lord Falkland; and the name has been fince extended, through inadvertency, to the two iflands that are feparated by it. See Falkland's *Iflands*.

MAIDHAT, a town of Perfia, in the province of Irak; 55 miles S.S.W. of Dainur.

MAIDSTONE, a borough and market-town in the hundred of that name, lathe of Aylesford, and county of Kent, England. It is beautifully fituated on the banks of the river Medway, whence it is fuppofed to have derived its name. The origin of this place is wholly uncertain. Camden, and fome others, have confidered it as the Vagniacæ of Antoninus, though upon very infufficient evidence. A few writers have alfo conjectured it to be the Caer Meguiad, or Megwad, mentioned in Nennius's Catalogue of Britifh Cities; but this opinion is equally doubtful with the former. The Saxons named it Medwegeftun, and it occurs in Domefday-book, by the appellation Meddeftane, of which terms its prefent name is an eafy and obvious corruption.

This town is a borough by prefcription, and the capital of the county of Kent. In ancient times it was governed by a portreve and twelve brethren. Edward VI., in the third year of his reign, formed it into a chartered corporation, by the ftyle of the "mayor, jurats, and commonalty;" and about the fame time members were firft returned from hence to ferve in parliament. The charter granted by this monarch was either renewed, or confirmed with additional privileges, by feveral fucceffive kings. By the laft charter, dated in 1748, the government was vefted in a mayor, twelve jurats, forty common council-men, a recorder, two ferjeants at mace, and other inferior officers. Freemen, not receiving alms, have the right of electing the burgeffes to parliament.

Maidftone extends about a mile in length, from north to fouth, and fomewhat more than three quarters in breadth, from eaft to weft. The principal portion of its buildings ftands on the eaftern bank of the river, by which it is watered, rifing gradually from its brink. It comprifes chiefly four principal ftreets, which interfect each other; with fome leffer ones branching off from them at right

nagles.

angles. The high ſtreet, in particular, is very ſpacious, and moſtly well-built. Every part of the town has been conſiderably improved within theſe few years. In 1791, an act of parliament was obtained for the purpoſe of having it new paved and lighted, and its different market-places repaired; which act has been carried into execution with great efficacy and judgment. The church, one of the largeſt parochial edifices in the kingdom, is a very handſome embattled building, conſiſting of a nave, aiſles, and chancel. It is adorned with a lofty embattled tower, which formerly ſupported a ſpire, but the latter was deſtroyed by lightning in November, 1730. The windows are large, and ornamented with rich tracery, particularly that facing the eaſt. By whom this church was firſt conſtructed, is uncertain; but it is well aſcertained to have been rebuilt by archbiſhop Courtney in the time of Richard II. from whom he obtained a licence to render it collegiate, for the uſe of the warden, chaplains, and other members of the new college, then building cloſe to the ſouthern ſide of the cemetery. This prelate was buried in the centre of the chancel, in a grave about five or ſix feet deep, whence his bones were diſcovered in 1794; but his monument has been long ſince deſtroyed. On the north ſide of the chancel ſtands a very ancient defaced tomb, raiſed in honour of one of the Woodvilles, anceſtors to king Edward IV.th's queen; and in the vaults within the communion-rails ſeveral of the ennobled families of Aſtley and Marſham lie buried. At the corner of Eaſt-lane is the priory, or friary, ſo called from having been anciently the houſe of a convent of Franciſcans, or Grey Friars, founded here by Edward III., but which was afterwards removed to Walſingham, in Norfolk. Faith's chapel, in the northern diſtrict of the town, appears to have been long uſed as a place of worſhip, but its hiſtory is very little known. The free grammar-ſchool is a foundation of conſiderable repute, ſome of the firſt literary characters in this country having been educated here. The ſchool-room, and part of the adjoining buildings, originally formed the chapel and lodgings of the "Fraternity of Corpus Chriſti," which was founded by a few of the inhabitants profeſſing the rule of St. Benedict. Beſides the free-ſchool, there are two charity ſchools, eſtabliſhed through the intereſt of the Rev. Dr. Joſiah Woodward; two ranges of alm-houſes, and a poor's-houſe, erected in 1720. The ſhire-hall, a good modern edifice, is appropriated to public buſineſs. The aſſizes for the county are held here, as are alſo the quarterly ſeſſions, and other county courts. Adjoining to this place is a priſon, called the *Brambles*, which anciently belonged to the archbiſhops of Canterbury, but now to the corporation. The gaol, in Eaſt-lane, erected in 1741, has ſince been much enlarged and improved. At the upper end of High-ſtreet is a conduit, which forms the chief reſervoir for ſupplying the inhabitants with water. Another building, of the ſame kind, alſo ſtood in the middle of this ſtreet previous to the year 1793, when it was pulled down. A new octagon ſtructure, in the lower part of the town, contains a third reſervoir. The water which ſupplies theſe reſervoirs is brought by pipes laid under the Medway, from an incloſed ſpring, called Rocky-hill, in the Weſt-borough. The theatre, ſituated on the weſt ſide of High-ſtreet, is a neat ſmall building. In Earl's-ſtreet is Earl's-place, a curious ancient ſtone manſion, having a large Oriel window, filled with painted glaſs, and at a ſhort diſtance beyond Week-ſtreet are very extenſive barracks, both for infantry and cavalry, the erection of which has greatly increaſed the population of the town.

Maidſtone has been long celebrated as the firſt hop-market in the kingdom. Some manufactures, however, are likewiſe carried on here. The linen trade, firſt eſtabliſhed by a few refugees from the Netherlands, in the reign of queen Elizabeth, ſtill continues to flouriſh. There are beſides many paper-mills in the immediate neighbourhood, an extenſive diſtillery of Engliſh ſpirits, or Maidſtone Geneva, and ſome very conſiderable beer and porter breweries. The circumſtance of the tide rendering the Medway navigable for veſſels of fifty or ſixty tons, contributes much to facilitate and encourage the trade of this town in all its departments.

The principal events of hiſtorical importance immediately connected with Maidſtone, are the rebellion of ſir Thomas Wyatt, and the battle fought here in 1648, between the Kentiſh loyaliſts and the parliamentary forces under general Fairfax, in which the former were defeated after a moſt ſanguinary conteſt. The plague has at different periods made great ravages here. A ſudden thaw, in January 1795, alſo occaſioned conſiderable damage, not only in the town but in the adjacent country. Here was a palace belonging to the archbiſhop of Canterbury, now demoliſhed.

The population of this town, according to the parliamentary returns of 1801, was eſtimated at 8027, *viz.* 3835 males, and 4192 females, of whom 5196 were returned as employed in various branches of trade, and 1306 in agriculture. The market days are Thurſday in every week, and the ſecond Tueſday of every month, when ſupplies of all kinds are abundant. The neighbourhood is adorned by a number of gentlemen's ſeats, ſpread throughout a fertile vale, where meadows, woodlands, rich orchards, and flouriſhing hop-grounds combine to exhibit a moſt extenſive variety of picturesque and romantic ſcenery. Gibraltar-houſe, on the oppoſite ſide of the river from the town, forms an agreeable place of reſort during the ſummer ſeaſon. The Mote, the ſeat of the earl of Romney, lying about a mile to the S.E. of the town, was anciently the reſidence of the Wyatt family, and forfeited upon the attainder of ſir Thomas by queen Mary. In the park, which is extenſive, is erected a pavilion, on the ſpot where his majeſty was entertained after the review of the Kent volunteers in 1799. Allington-caſtle, on the weſtern ſide of the river, is ſtill an intereſting ruin. It is ſaid to have been originally erected in the time of the Saxons by the noble family of the Columbavii, but being razed by the Danes, was rebuilt by the great earl Warrene. It was ſome time alſo the property of the Wyatts, and afterwards of the Aſtleys. The chapel, a ſmall gloomy edifice, contains ſeveral monuments in honour of the latter family. Newton's Hiſtory and Antiquities of Maidſtone, 8vo. Haſted's Hiſtory, &c. of Kent, 4 vols. folio, and 12 vols. 8vo. Alſo, Beauties of England and Wales, vol. vii.

Maidstone, a townſhip of America, in Eſſex county, Vermont, on Connecticut river, containing 152 inhabitants.—Alſo, a townſhip of Upper Canada, between Sandwich and Rocheſter, upon lake Erie.

MAJESTY, Majestas, a title or quality given to kings; and which frequently ſerves as an appellation to diſtinguiſh them by.

The word ſeems compoſed of the two Latin words, *major*, *greater*, and *ſtatus*, *ſtate*.

The emperor is called, his Cæſarian or Imperial majeſty; the king of Spain, his Catholic majeſty; the king of France, formerly, his moſt Chriſtian majeſty; the king of Great Britain, his Britannic majeſty, &c. Some have alſo extended this title to the popes.

Paſquier obſerves, that our forefathers uſed this quality very ſparingly; and that the frequent uſe of the word, which now obtains, had not its beginning before the reign of their Henry II. He inſtances ſeveral letters of St. Gregory.

gory, who, writing to king Theodoret and Theodoric, only compliments them with excellency.

Till the time of Charles V. the king of Spain had no title, but that of highneſs; Louis XI. was the firſt in France who aſſumed this title; and before our king Henry VIII. the kings of England were only addreſſed under the titles of grace, which began in the time of Henry IV., and excellent grace, under Henry VI., and highneſs. See King.

At the peace of Munſter, there was a great conteſt between the miniſters of the emperor and thoſe of France; the firſt would not allow the title of ſerenity to the king of France, and the latter would not give that of majeſty to the emperor. At laſt it was agreed, that whenever the French king ſhould write with his own hand to the emperor, he ſhould give him the title of imperial majeſty; and reciprocally, when the emperor ſhould write to the king, he ſhould give him that of royal majeſty.

Under the Roman republic, the title majeſty, *majeſtas*, belonged to the whole body of the people, and to the principal magiſtrates; ſo that to diminiſh or wound the majeſty of the commonwealth, was to be wanting in reſpect to the ſtate, or to its miniſters. But the power afterwards paſſing into the hands of a ſingle perſon, the appellation of majeſty was transferred to the emperor, and the imperial family. Pliny compliments Trajan on his being contented with the title of greatneſs; and ſpeaks very invidiouſly of thoſe who affected that of majeſty. And yet majeſty ſeems to be the moſt modeſt and juſt title that can be attributed to ſovereigns, ſince it ſignifies no more than the royalty, or ſovereign power.

MAIEUL, St., *Regular Clerks of.* See Fathers *of Somaſquo.*

MAIG, in *Geography*, a river of Ireland, in the county of Limerick, which riſes in the Galtees, croſſes the county, and falls into the Shannon, ſome miles below Limerick.

MAIGNAN, Emanuel, in *Biography*, an able philoſopher and mathematician, was born at Toulouſe in the year 1601. He gave early indications of an inquiſitive diſpoſition and an inclination for learning. He went through a courſe of grammar-learning at the college of the Jeſuits; here he ſpent his vacant hours in improving his mind, and at eighteen years of age he determined to renounce the world, and was admitted into the fraternity of the Minims. In ſtudying philoſophy, he became diſſatisfied with the principles of Ariſtotle, and took every opportunity of expoſing them to contempt. He took delight in inventing and ſolving geometrical problems, which he could do with eaſe and accuracy, though at this time he had never ſeen the Elements of Euclid, nor any other book written with the ſame view. When his mathematical acquirements were diſcovered, he was immediately appointed by his ſuperiors to the mathematical chair, which he filled with ſuch addreſs and judgment, that his reputation ſoon ſpread beyond the boundaries of his own country. He obtained higher preferment, and rendered himſelf diſtinguiſhed by his mathematical diſcoveries and phyſical experiments, which extorted the applauſe and admiration of thoſe who were moſt converſant in thoſe ſciences. A circumſtance that contributed to extend the fame of his learning, was a conteſt which aroſe between him and father Kircher concerning an invention in optics. In 1648, Maignan printed at Rome his treatiſe "De Perſpectiva Horaria," which met with a very favourable reception, and which contains a method of making teleſcopes, invented by himſelf, which he fully explains without any attempt at myſtery or diſguiſe. In the year 1650, Maignan returned from Rome to Toulouſe, and was created provincial, and in 1652 he publiſhed, in Latin, his "Courſe of Philoſophy," in four volumes, octavo, by which he might be conſidered as the reſtorer of it. When this work appeared, the adherents to the Ariſtotelian ſyſtem inſiſted that it was impoſſible to reconcile the author's opinions with the truths of religion. This objection Maignan undertook to refute, in a work entitled "Philoſophia Sacra." In 1657 he was choſen to ſupply the place of father Merſenne, in a ſociety of learned men, who held their meetings at the houſe of Henry Lewis de Montmort, maſter of the requeſts.' In 1660, when Lewis XIV. paſſed through Toulouſe on his return from his marriage, he viſited the cell of father Maignan as one of the moſt curious objects in the province. The monarch was ſo ſtruck with what he ſaw, that he was deſirous of tranſplanting the venerable father to his capital, but he had higher objects in view than to ſhine in courts; he was ſeeking after truth, and endeavouring to enlarge the boundaries of ſcience, and preferred the obſcurity of a cloiſter to the ſplendour attached to a palace. In 1662, father Maignan publiſhed the firſt volume of his "Philoſophia Sacra," which drew him into a long controverſy with ſeveral learned opponents, of which a full account is given by Bayle. In 1672 he publiſhed replies to all his antagoniſts, and in the ſame year he gave the world the ſecond volume of his "Philoſophia Sacra," which was followed by a diſſertation "De uſu licito Pecuniæ." Theſe literary labours did not prevent him from reading lectures to his pupils, and ſuperintending the inſtruction of the younger members of his order. Beſides this he was engaged in an extenſive correſpondence with the principal philoſophers of his own age. Scarcely was any man more induſtrious than Maignan: to uſe the expreſſion of one of our countrymen, it might be ſaid, that "Leiſure and he had taken leave of one another" from an early period of his life. He is ſaid to have ſtudied in his ſleep; for in his dreams he was often employed on ſome theorems, the deductions of which he purſued till he arrived at their demonſtration; and he was often ſuddenly awakened by the exceſſive pleaſure which he felt in ſuch diſcoveries. He died at Toulouſe in 1676, in the ſeventy-fifth year of his age. The innocence of his life, the ſimplicity of his manners, and his amiable virtues, rendered him no leſs the object of eſteem, than he was of reſpect, on account of his genius and learning. Bayle. Moreri.

MAIHERGA, in *Geography*, a town of Africa, in Sahara; 100 miles S.S.E. of Algiers.

MAII Inductio, in *Antiquity*, denotes an ancient cuſtom for the prieſt and people of country villages to go in proceſſion to ſome adjoining wood on a May-day morning; and return with a May-pole, boughs, flowers, garlands, and other tokens of the ſpring. This May-game, or rejoicing at the coming of the ſpring, was for a long time obſerved, and ſtill is in ſome parts of England; but it was condemned and prohibited in the dioceſe of Lincoln by biſhop Groſthead.

MAJIR, in *Geography*, a town of Africa, in Biledulgerid. N. lat. 33° 30′. E. long. 6° 29′.

MAIL, Maille, is primarily applied to the meſhes or holes in net-work.

This term in heraldry originally expreſſed the meſh of a net, and is derived from *macula*, Lat. or *maſcle*, Fr. ſignifying the ſame. Richlet ſays, *mailler* is uſed as a verb neuter, to expreſs the art of netting. Some derive it from the Iriſh word *mala*, ſaid to ſignify armour; or the word *mail*, which in Welſh properly means ſteel, and metaphorically hardneſs and armour. (See Rowland's Mona Antiqua.) Boyer in his French Dictionary tranſlates the word *maille*, a little iron ring.

Mail,

MAIL, *Black.* See BLACK *Mail.*

MAIL, *Coat of.* See COAT *of Mail.*

It is called alfo an *Habergeon;* which fee.

Anciently they alfo wore fhirts of mail under the waiftcoat, to ferve as a defence againft fwords and poniards. We alfo read of gloves of mail.

Of mail there are two forts, *viz.* chain and plate mail. Chain mail is formed by a number of iron rings, each ring having four others inferted into it; the whole exhibiting a kind of net-work, with circular mefhes, every ring feparately rivetted. This kind of mail anfwers to that worn on the ancient breaft-plates; whence they were denominated "loricæ hammatæ," from the rings being hooked together. Thus, "Loricam confertam hamis, auroque trilicem," Virg. Æn. l. iii. v. 67. Plate mail confifted of a number of fmall laminæ of metal, commonly iron, laid one over the other, like the fcales of fifh, and fewed down to a ftrong linen or leathern jacket, by thread paffing through a fmall hole in each plate. This was exactly the form of the ancient "lorica fquammofa." Similar to this is the Sarmatian cuiraffe (fee CUIRASSE), defcribed by Paufanias, as quoted by Lipfius and Montfaucon. They take the hoofs of their horfes, which they cleanfe and polifh, and then cut in little pieces like dragon's fcales; which done, they bore the fcales, and afterwards few them with the finews of an ox or horfe: the dragon's fcales refemble the divifions in a pine-apple when it is green. Thus they make their cuiraffes, which, for beauty and ftrength, are not inferior to thofe of the Gauls, for they very well fuftain both diftant and clofe blows; whereas the cuiraffes of linen are not fo fure, nor proof againft iron. The linen ones are commodious for hunters, as the lions and leopards cannot penetrate them with their teeth. The cuiraffe covered the body before and behind: it confifted of two parts, a breaft and back piece of iron, faftened together by means of ftraps and buckles, and other fimilar contrivances. They were originally, as the name imports, made of leather, but afterwards of metal, both brafs and iron. To the cuiraffe was buckled the armour for the fhoulders and arms; the firft called "pouldrons," the fecond "braffarts," garde bras, les avant bras, and corruptly in Englifh "vambraces." At the joint or bending of the arm, the vambraces were cut obliquely; the vacancies on the infide, when the arms were ftraightened, were covered by pieces of mail called "gouffets," and afterwards by a contrivance of plates refembling hearts. Cuiraffes with entire fleeves of mail are mentioned by different military writers. A defence for the arms, called "fplints," conftituted part of the fuit denominated an "almaine ryvett." The hands were defended by gauntlets, fometimes of chain mail, but more frequently of fmall plates of iron, rivetted together; in imitation of the lobfter's tail, fo as to yield to every motion of the hand. Some gauntlets inclofed the whole hand, as in a box or cafe; others were divided into fingers, each finger confifting of eight or ten feparate pieces, the infide being gloved with buff leather: fome of thefe reached no higher than the wrift, others to the elbow; the latter were ftyled long-armed gauntlets, many of which are to be feen in the Tower of London. The thighs of the cavalry were defended by fmall ftrips of iron plate, laid horizontally over each other, and rivetted together, forming what were called "cuiffarts," or thigh pieces: of thefe fome entirely enclofed the thighs, and others only covered the front of them, the infide next the horfe being unarmed. They were made flexible at the knees by joints, like thofe in the tail of a lobfter, and were called "genouillieres," or knee-pieces. Taffets, or fhirts, hooked on to the front of the cuiraffe, were ufed by the infantry. For the defence of the legs were worn a fort of iron-boots, called "greeves." Plates of iron covering the front of the leg were alfo frequently worn over the ftockings of mail. The greeves commonly covered the whole leg, as in the armour of John of Gaunt, and that of Henry VIII.; with thefe they had broad-toed iron fhoes, with joints at the ankle; fometimes they had fabatons of mail. Boots of jack-leather, called curbouly (cuir bouille), were alfo worn by horfemen: thefe are mentioned by Chaucer. The "hauberk" was a complete covering of mail from head to foot. It confifted of a hood, joined to a jacket with fleeves, breeches, ftockings, and fhoes, of double chain mail, to which were added gauntlets of the fame conftruction. Some of thefe hauberks opened before like a modern coat; others were clofed like a fhirt. In France only perfons poffeffed of a certain eftate, called "un fief de hauber," were permitted to wear a hauberk, which was the armour of a knight; efquires might only wear a fimple coat of mail, without the hood and hofe. The "haubergeon" was a coat compofed either of plate or chain mail, without fleeves; the fhirt of mail was much in the form of the fhirts now worn, except that it had no fleeves: it was always of chain mail. Grofe's Mil. Antiq. vol. ii. See ARMOUR.

MAIL, or *Mall,* alfo fignifies a round ring of iron; whence the play of pall-mall, from *palla,* a ball, and *maille,* the round ring on which it is to pafs.

MAIL is likewife ufed for the leathern bag in which letters are carried by the poft.

MAIL-*Coach,* a carriage particularly and exprefsly appropriated for the conveyance of letters to all parts of Great Britain. It is diftinguifhed for its expedition and fecurity; two moft important confiderations in a populous, commercial, and wealthy country. Previous to the year 1784, letters were conveyed from the metropolis to diftant parts of the kingdom, and *vice verfâ,* by carts with a fingle horfe to each, or by boys on horfeback; in confequence of which, many robberies were committed, delays occafioned, and loffes fuftained. John Palmer, efq. afterwards comptroller-general of the poft-office, devifed a new plan, which he recommended to government, as calculated to increafe the revenue, accommodate the public, and be highly advantageous to all parties. His propofal was acceded to, and the inventor has been rewarded with a large annual income. His plan was to provide a certain number of coaches, of light conftruction, and each to be adapted to carry the various bags or packets of letters, which were deftined for a particular part of the country, or line of road. All the coaches were to leave London precifely at 8 o'clock in the evening, and to arrive at and leave certain poft-towns at fpecific times. Each coach is drawn by four horfes, travels at the rate of eight miles an hour, including the time allowed for change of horfes, &c; and each coach is provided with a coachman, a guard with fire-arms, and allowed to carry four paffengers infide, and two outfide. The prefent fare (1812) is about *6d. per* mile for each of the former paffengers, and *4d.* for the latter. The fyftematic regularity, punctuality, fuperior fafety, and expedition of the mail-coaches of England render them peculiarly eligible and convenient for travellers. The property and profits of the poft, or conveyance of letters, are vefted in government, which contracts with the proprietors of coaches for the carriage of the mail; but thefe proprietors derive their chief profit from the fare of paffengers, and carriage of fmall packets. The mail-coach eftablifhment is under the fuperintendance of T. Hafker, efq. For further particulars, fee POST *Office.* The mail-coaches run above 13,000 miles daily. There is a fimilar eftablifhment in Ireland.

MAILAH, in *Geography*, a river of Africa, which rifes in the Sahara, and difcharges itfelf into the Shott.

MAILCOTTA, or MILGOTTAH, a town of Hindooftan, in the Myfore; where the Mahratta chiefs met lord Cornwallis in the year 1791; 15 miles N. of Seringapatam.

MAILED, implies a thing fpeckled, or full of fpecks; as the feathers of hawks, partridges, &c. or the furs of fome wild beafts.

MAILLA, JOSEPH-ANNE-MARY DE MOYRIAC DE, in *Biography*, a Jefuit miffionary, was born at Maillac, and, having been educated by the fociety, was fent on the miffion to China in 1703. He was employed by the emperor Kam-hi, with other miffionaries, to make the map of China and Chinefe Tartary, which was engraved at Paris. He afterwards made particular maps of feveral of the provinces. Being fixed at the imperial court, he had accefs to the "Great Annals of China," which he tranflated into French, and fent over his MS. to France, where it was partly printed, and intended to make 12 volumes 4to. This work forms the moft complete hiftory of the Chinefe empire. Mailla died at Pekin in 1748, in his 79th year, after a refidence of 45 years in China. His remains were interred at the expence of the emperor Kien-Long.

MAILLE, in the *French Coinage*, denotes a fmall weight ufed for gold and filver, 40 of which are equal to the ounce, or one-eighth of the mark = 3778 Englifh grains.

MAILLE, in our *Old Writers*, a fmall kind of money. Silver half-pence were likewife termed mailles, 9 Hen. V. By indenture in the mint, a pound weight of old fterling filver was to be coined into three hundred and fixty fterlings, or pennies, or feven hundred and twenty mailles, or halfpennies, or one thoufand four hundred and forty farthings. Hence the word maille was derived, which is now vulgarly ufed in Scotland to fignify an annual rent. Hence *white maille*, white rents, (vulgarly called quit-rents,) were rents made in filver; and *black maille* denoted properly rents paid in cattle, otherwife called *neat gelt;* but more largely it was ufed to fignify all rents not paid in filver. See BLACK *Maile*.

MAILLET, BENEDICT DE, in *Biography*, born of a good family of Lorraine in 1659, was nominated, at the age of thirty-three, conful-general of the French nation in Egypt: after which, he obtained the confulate of Leghorn. In 1715 he was appointed to vifit all the factories of Barbary and the Levant; and executed his commiffion fo much to the fatisfaction of the government, that he obtained leave to retire with a penfion He died at Marfeilles in the year 1738. He had, during his whole life, been a diligent ftudent of natural hiftory, which his lively fancy turned into fyftem, which for fome time interefted the public. He maintained that all the land of this earth, and its vegetable and animal inhabitants, rofe from the bofom of the fea, on the fucceffive contractions of the waters: that men had originally been tritons with tails; and that they, as well as other animals, had loft their marine, and acquired terreftrial forms, by their agitations when left on dry ground. The work was publifhed after the death of its author, by La Mafcrier; who alfo publifhed, in 1743, "A Defcription of Egypt," drawn up from the papers of De Maillet.

MAILLEZAIS, in *Geography*, a town of France, in the department of the Vendée, and chief place of a canton, in the diftrict of Fontenay-le-Comte; 6 miles S. of Fontenay. This was once the fee of a bifhop, fince removed to Rochelle. The place contains 135 , and the canton 12,622 inhabitants, on a territory of 200 kiliometres, in 13 communes.

MAILLS, on *Ship-board*, are fquare machines, compofed of a number of rings interwoven net-wife, and ufed for rubbing off the loofe hemp which remains on lines or white cordage, after it is made.

MAIMATSCHIN, in *Geography*, a Chinefe frontier town, or village, on the confines of Siberia, oppofite to *Kiakta*, which fee. Its name denotes the "fortrefs of commerce." It is fituated about 140 yards S. of the fortrefs of Kiakta, and nearly parallel to it. Midway between this place and the Ruffian fortrefs, two pofts about 10 feet high are painted, in order to mark the frontiers of the two empires; one is infcribed with Ruffian, the other with Manfhur characters. Maimatfchin is fortified with a wooden wall, and a fmall ditch about three feet broad; the latter having been dug in the year 1756, during the war between the Chinefe and Kalmucs. The town is of an oblong form; its length is 700 yards, and its breadth 400. On each of the four fides a large gate faces the principal ftreets; and over each of thefe gates is a wooden guard-houfe for the Chinefe garrifon, which confifts of Mongols in tattered clothes, and armed with clubs. Without the gate, which looks to the Ruffian fortrefs, at the diftance of about eight yards from the entrance, the Chinefe have raifed a wooden fconce, fo as to interrupt all view of the ftreets from without. This town contains 200 houfes, and about 1200 inhabitants. Its two principal ftreets, about eight yards broad, crofs each other in the middle at right angles, with two by-ftreets running from north to fouth. They are not paved, but laid with gravel, and kept very clean. The houfes are fpacious, uniformly built of wood, and of only one ftory, about 14 feet, in height: they are plaiftered and white-wafhed; they are conftructed round a court-yard of about 70 feet fquare, which is ftrewed with gravel, and appears neat. Each houfe confifts of a fitting-room, fome warehoufes, and a kitchen. The windows are large, and, on account of the dearnefs of glafs and Ruffian talc, are generally of paper, excepting a few panes of glafs in the fitting-room. The afpect of the fitting-room is feldom towards the ftreets: it is a kind of fhop, in which the feveral patterns of merchandize are placed in receffes, fitted up with fhelves, and fecured with paper doors for the purpofe of keeping out the duft. In this room there are feveral niches, covered with filken curtains, before which are placed lamps, that are lighted upon feftivals: thefe niches contain painted paper idols, a ftone or metal veffel, in which the afhes of incenfe are collected, feveral fmall ornaments, and artificial flowers. The fouth-weft quarter of the town is inhabited by the merchants of Bucharia, who bring to Ruffia cotton, ftuffs and half-filks, fpun and raw cotton, lamb-fkins, precious ftones, gold duft, unprepared nitre, fal ammoniac, &c. The governor of Maimatfchin has the care of the police, as well as the direction of all affairs relating to commerce: he is generally a perfon of rank, often a mandarin, who, having been guilty of mifconduct in fome other ftation, is fent here by way of punifhment. His power is confiderable; and though his falary is not large, the prefents he receives annually from the merchants amount to a confiderable fum. The moft remarkable public buildings in Maimatfchin are the governor's houfe, the theatre, and two pagodas. In the fmall pagoda is a picture reprefenting the god Tien, which, according to the explanation of the moft intelligent Chinefe, fignifies the moft high God, who rules over the 32 heavens. He is reprefented in a fitting pofture, with his head uncovered, and encircled with a ray of glory; holding in his right hand a drawn fword, and extending his left as in the act of giving benediction. On one fide of this figure are two youths; on the other a maiden and a grey-headed old man

man are delineated. In this temple there are no altars: it is opened only on feſtivals, and ſtrangers cannot ſee it without a ſpecial order. The great pagoda, which is larger and more magnificent than the former, is acceſſible to all ſtrangers, under the conduct of a prieſt. We cannot here deſcribe in detail the various parts of this ſtructure: the temple, which is an elegant Chineſe building, and richly decorated, contains five idols of a coloſſal ſtature, filling the whole northern ſide. The principal idol is denominated "Ghedſur," or "Gheſſur Chan;" his ſize is gigantic, and his face gliſtens like burniſhed gold; on his head he has a crown, and his garments are made of the richeſt ſilk; in his hand is a tablet, to which he directs a ſteady attention. Two ſmall female figures, reſembling girls about 14 years of age, ſtand on each ſide of the idol. The other idols are of an enormous ſize, though leſs in magnitude than Gheſſur Chan. Tapers and lamps are kept burning day and night before the idols. There are various utenſils in the temple, marked with Chineſe devices and inſcriptions; and, among others, a hollow wooden black lacquered helmet, which all devout perſons ſtrike with a wooden hammer, whenever they enter the temple. The firſt day of the new and full moon is appointed for the celebration of worſhip, upon each of which days no Chineſe ever fails to make his appearance once in the temple. Their principal feſtivals are held in the firſt month of the year, called the white month, and anſwering to our February. Mr. Pallas has given us the following deſcription of their ſuperſtitious behaviour during an eclipſe of the moon. At the cloſe of the evening in which it appeared, all the inhabitants were employed in raiſing an uproar, by hideous ſhrieks, knocking wood, and beating cauldrons; which noiſe was heightened by ſtriking the bell and beating the kettle drums of the great pagoda. The Chineſe ſuppoſe, that during an eclipſe the wicked ſpirit of the air is attacking the moon, and that he is frightened away by theſe hideous ſhrieks and noiſes. When a fire occurred at Maimatſchin, none of the inhabitants attempted to extinguiſh it, but ſtood round it in idle conſternation, occaſionally ſprinkling water on the flames, in order to ſoothe the fire god, who, as they imagined, had choſen theſe houſes for a ſacrifice.

The merchants of Maimatſchin come from the northern provinces of China, chiefly from Peking, Nanking, Sandchue, and other principal towns. They come hither without their wives and families; for there is not one woman at Maimatſchin. This circumſtance is owing to the policy of the Chineſe government, which totally prohibits women from having the ſlighteſt intercourſe with foreigners. For the mode of carrying on commerce between the Chineſe and Ruſſians, and the principal articles which they mutually exchange, we refer to the article KIAKTA.

MAIMBOURG, LEWIS, in *Biography*, an eccleſiaſtical hiſtorian, was born at Nancy, in France, in the year 1610. When ſixteen years of age he was entered in the ſociety of Jeſuits, and ſoon became a teacher of the claſſics in their ſchools. He was much celebrated afterwards as a preacher, though he has been generally charged with introducing into the pulpit low and vulgar deſcriptions, and ſallies of wit, or even buffoonery, highly unbecoming his ſacred office. As a writer, as well as a preacher, he was perpetually attacking the Janſeniſts, and in 1682 he wrote a treatiſe againſt the pretenſions of the church of Rome, and in ſupport of the liberties of the Gallican church: on account of this he was ordered by pope Innocent XI. to be expelled the ſociety. For this diſgrace, the king made him ample recompence by the grant of a penſion, on which he retired to the abbey of St. Victor at Paris, where he died in 1686, at the age of ſeventy-ſix. He was a very voluminous writer; his hiſtorical productions originally formed ſixteen volumes, in 4to.; they conſiſt of "The Hiſtory of the Cruſades;" "The Hiſtory of the League;" "The Hiſtory of the Decline of the Empire after Charlemagne;" "The Hiſtories of the Pontificates of St. Gregory the Great, and of Leo;" "The Hiſtory of the Schiſm of the Greeks; and of the Schiſm in the Eaſt;" "The Hiſtories of Arianiſm; of the hereſy of the Iconoclaſts; of Lutheraniſm; and of Calviniſm." Bayle. Moreri.

MAIMONIDES, MOSES, or Moſes the ſon of Maimon, a Jewiſh rabbi, was born at Cordova, in Spain, in 1131. He has, by way of eminence, been called "The Doctor," and "The Eagle of the Doctors." He was, in every ſenſe of the term, deſcended from illuſtrious anceſtors, ſix of his anceſtors having been diſtinguiſhed by the title of wiſe. The early part of his education was undertaken by his father; who in due time provided him tutors from the moſt learned men of his age. He poſſeſſed very ſuperior abilities, and made a rapid progreſs in all the branches of knowledge to which his attention was directed. He was perfectly ſkilled in the Hebrew, Arabic, Chaldee, Turkiſh, Median, and other languages. With all the branches of philoſophy and the mathematics he was intimately acquainted, and alſo with Jewiſh juriſprudence, as is evident, not only by the comments with which he illuſtrated the whole body of laws of the Hebrews, but by the ability and judgment with which, from a confuſed and moſt intricate maſs, clothed in corrupt and varying dialects, he reduced them to a regular ſyſtem, written in pure Hebrew, and in an eaſy and elegant ſtyle. He likewiſe acquired a profound knowledge of the medical art, in the practice of which he attained the higheſt reputation. His very extraordinary talents and accompliſhments in almoſt every ſpecies of learning excited the jealouſy of his contemporaries; to avoid the ill effects of this, he reſolved to quit Spain, and remove into Egypt, before he was thirty years of age. From this circumſtance, and from his reſiding in that country during the remainder of his life, he is, by ſome writers, called "Moſes Ægyptius;" by others he is named "Moſes Cordubenſis," from the place of his birth. In Egypt he opened a ſchool, to which a number of pupils reſorted from all parts, and particularly from Alexandria and Damaſcus, who made ſuch improvement under his inſtructions, that they proved the means of ſpreading his fame throughout the world. He was appointed phyſician to Saladin, ſultan of Egypt, who entertained for him the higheſt reſpect. His reputation was ſo great that he was applied to for advice and counſel by perſons of the very firſt rank. Among others, the rabbi Aben Tybbon, wiſhing for a ſolution of ſome ſerious difficulties, on important points, propoſed to pay him a viſit, that they might diſcuſs the matters at length in converſation. To which Maimonides replied, that nothing would afford him greater pleaſure than ſuch an interview: nevertheleſs he could not encourage him to undertake ſo long a voyage, becauſe his own time was ſo fully occupied, that he could ſcarcely promiſe him his company for a ſingle hour, either in the day or at night: "I live," ſaid the learned doctor, "in Egypt, at the diſtance of nearly two ſabbath-days' journey from Al-Cairo, where the king reſides. On him the duties of my appointment require a very regular attendance. I generally viſit him every morning; but when either himſelf, or any of his children, or of his concubines, are ſick, I am not allowed to ſtir from the palace, ſo that I very often ſpend the whole day at court: if I find nothing amiſs at court, I return home towards noon, but when arrived at my houſe, almoſt famiſhed for want of food, I find all the approaches to it crowded

with

with Gentiles and Jews, men of all ranks who have been impatiently waiting my return. No fooner have I alighted from my horfe, and wafhed my hands, than I humbly requeft the indulgence of the multitude till I have appeafed my craving appetite. As foon as I have dined, I examine the cafes of my patients, and prefcribe for them. This employment commonly lafts till night, when I am fo overcome with the fatigue of hearing, fpeaking, and prefcribing, that I can fcarcely fpeak any longer, or even keep myfelf awake." Maimonides, after having fpent a long and moft ufeful life, died at the age of feventy, in the 1204th year of the Chriftian era, and was interred, with the higheft funeral honours, in the land of Canaan. For three whole years did the people at large bewail his death, and they called the year in which it took place, "Lamentum Lamentabile;" and in fpeaking of him, they ufed to fay, that from the time of Mofes the prophet, no one approached fo nearly to him in wifdom and found learning, as Mofes the fon of Maimon. He is frequently defignated in the writings of the Jews by the name of Rambam, the confonants of which are the initials of the words Rabbi Mofes Ben Maimon. Notwithftanding his avocations as a phyfician, he devoted much of his time to the compofition of learned works, a few of which may be mentioned: the firft, in the order of time, was his "Pirufh Hemifhnah," or, a commentary on the Mifhna, which he began in Spain, when he was in the twenty-third year of his age, and finifhed in Egypt, when he was about thirty. It was written in the Arabic language, and tranflated into Hebrew by Rabbi Aben Tybbon. The beft edition of this work is publifhed with the Mifhna, at Amfterdam, in 1698, in 16 volumes, folio. The prefaces were publifhed in Arabic, but in the Hebrew characters by our countryman Dr. E. Pococke, under the title of "Porta Mofis," in the year 1655. The next work to be noticed is entitled "Jad Chazekeh," or *Strong Hand*, which is alfo named "Mifhna Hathora," or *The Reception of the Law;* it confifts of a compendium of the *Talmud*, which fee, and prefents a complete code of Jewifh, civil, and canon law, with a commentary. The beft edition is that of Amfterdam, in 1702, in four volumes, folio. The principal work of this great man is entitled "More Nevochim," or *Guide to the Perplexed*, which is partly critical, partly philofophical, and partly theological; its defign being to illuftrate and explain the meaning of the fcriptures. It was tranflated from the Arabic into Hebrew by R. Aben Tybbon, in the year 1551, and publifhed at Venice; Buxtorf the younger gave an excellent verfion of it in the Latin tongue, which was publifhed at Bafil in 1629. Another important work of Maimonides is his "Sepher Hamitzoth," or *Book of Commandments*, containing an expofition of the precepts of the Mofaic law. The titles of the other pieces of Maimonides may be feen in Wolfii Biblioth. Heb.

MAIN, East, or *Slude river*, in *Geography*, a river of Canada, which runs into James bay. N. lat. 52° 18'. W. long. 78 45'. On the eaft of this river is *Eaft Main Houfe*, a ftation for the Indian trade in Canada. N. lat. 52° 15'. W. long. 78° 42'.

Main, a town of Perfia, in the province of Farfiftan; 14 leagues N. of Schiras; the inhabitants of which being defcendants of the ancient Spartans, have never yet been conquered by the Turks.

Main, *Chief*, or *Principal*. Thus the main-maft is denominated, in contradiftinction to the fore or mizen-maft: the main-keel, main-wales, main-hatchway, main-breadth, &c. are thus diftinguifhed from the falfe-keel, channel-wales, and the fore and after hatchways. The main breadth is the broadeft part of the fhip, and is contained between the upper and lower heights of the breadth lines.

Main-*body of an army*, is the body of troops that marches between the advance and the rear guard. In a camp it is that part of an army which is encamped betwixt the right and left wings.

Main-*guard*. See *Great* and *Main* Guard.

Main *Harmonique*, Fr. See Harmonic-*Hand*, Hexachords, and Solmisation.

MAINA, in *Geography*, a fea-port town of the Morea, near the W. coaft; 30 miles S. of Mifitra.

MAINBAYA, a town of Ava; 15 miles N. of Prome.

MAINBURG, a town of Germany, in the circle of Bavaria, on the Ambs; 32 miles N.N E. of Munich.

MAINE, a divifion of France, before the Revolution, which was divided into Upper and Lower Maine; about 18 miles long and 20 broad. It now chiefly forms the departments of the Mayenne and Sarte.—Alfo, a river of Germany, which rifes in the marquifate of Culmbach, on the confines of Bohemia, and after paffing by a number of principal towns, joins the Rhine, a little above Mentz.

Maine, a diftrict or province of the United States of America, belonging to the Maffachufetts, bounded on the N. by Lower Canada, E. by the province of New Brunfwick, S. by the Atlantic ocean, W. by New Hampfhire, from which it is partly feparated by the Pifcataqua river, and fituated between N. lat. 43 and 48 15', and between W. long. 64° 53', and 70° 39'. Its average length and breadth are each 200 miles; and it contains 40,000 fquare miles, or 25,600,000 acres. The diftrict of Maine is divided into feven counties, as in the following table.

Counties.	No. of Inhabitants. 1700.	1800.	Chief Towns.
York	28,821	37,729	York.
Cumberland	25,459	37,921	Portland, the metropolis of the diftrict.
Kennebeck	——	24,394	Augufta.
Lincoln	29,962	30,100	Wifcaffet.
Hancock	9,549	16,316	Caftine.
Wafhington	2,758	4,436	Machias.
Oxford	——	——	
Total	96,540	150,896	

The chief rivers of this diftrict are Penobfcot, Kennebeck, Saco, Androfcoggin, St. Croix, &c. The moft noted lakes are Moofehead, Scoodri, Sebacook, and Umbagog. The principal bays are thofe of Cafco, Penobfcot, Machias, Saco, and Paffamaquoddy. Its moft remarkable capes are thofe of Neddock, Porpoife, Elizabeth, Small Point, Pemaquid, and Petit Manan. Almoft the whole coaft N.E. of Portland is lined with iflands, among which veffels may generally anchor with fafety. This diftrict, though an elevated country, cannot properly be denominated mountainous. The foil is generally arable and very fertile, more efpecially between Penobfcot and Kennebeck rivers. On fome parts of the fea-coaft the lands are but indifferent; but they might be much improved by manuring them with the rock-weed, which grows on the rocks between high and low water mark, in very large abundance. The fwamps and funken lands might be eafily drained, and afford a rich fat foil. The foil of the interior country is reprefented as being excellent, and well adapted both for tillage and pafture. Where the foil is properly prepared for receiving the feed, it is faid to be favourable for the growth of wheat, rye, barley, oats, peas, hemp, and flax, and for the production of almoft all kinds of culinary roots and plants, Englifh lish grafs, and alfo for Indian corn of fhort ftalk. Kennebeck is much improving in apple-orchards. Hops are the fpontaneous growth of the country. Peaches are fcarcely known; but plums, fmall cherries, fmall pears, grapes, rafpberries, goofeberries, currants, blackberries, and cranberries, are among the wild fruits of Maine. This country is uncommonly good for grazing, and large ftocks of neat cattle may be fed in it both fummer and winter. It abounds in white pine and fpruce trees, fuitable for mafts, boards, or fhingles; and maple, beech, red, white, and grey oak, and yellow birch, may be confidered as the principal productions of the country. The moift land produces fir, which yields a balfam that is much prized. Here are alfo elms, poplars, and afh trees; alfo bafs, horn-beam, butter-nut, balm of Gilead, and hemlock trees. Upon the whole, the diftrict of Maine may be regarded in the three following divifions of it; the *firft*, comprehending the tract lying E. of Penobfcot river; the *fecond*, and beft tract, lying between Penobfcot and Kennebeck rivers; and the *third*, firft fettled, and at prefent moft popular, W. of Kennebeck river. The climate in this diftrict, as well as in every part of North America, is colder than is the fame degree of latitude on the eaftern fide of the Atlantic. The weather is more regular here in the winter than it is in the fouthern ftates. Frofts commence fometimes in September, and always before the middle of October; the fevere cold begins about the middle of December; and fpring opens in the clofe of March. Of late the winters in this country are more moderate, and lefs fnow has fallen than twenty years ago.

From the different rivers of this country water may be drawn for mills and all water works; and its rivers furnifh plenty and variety of fifh. The falmon fifhery, in the bays and around the iflands, has of late years become a confiderable object to the inhabitants. The animals of this diftrict were formerly deer, and moofe of a large fize; but there are now few to be feen. The fox, bear, wolf, beaver, &c. are found here. Cattle and horfes are eafily reared in this country; and the fheep, on the Kennebeck river, are larger than thofe in Maffachufetts proper, the mutton is of higher flavour, and the fleeces are much heavier. The rattlefnake is the only poifonous ferpent in this diftrict, and is rarely feen. Birds, though increafing, are not numerous.

The manufactures and commerce of this country are in an improving ftate. From the firft fettlement of Maine till the year 1774 or 1775, and even in fome places to a later period, the inhabitants neglected agriculture and generally followed the lumber trade; but when they found that Indian corn, rye, potatoes, and flax grew in their fields, and afforded an immediate profit, they applied to the cultivation of the foil; and they now raife a fufficient quantity of corn and other grain for their own confumption; and they export from the Kennebeck, either in cattle or other articles, more than they import. Their wool and flax are very good; hemp has been lately cultivated with fuccefs: and almoft every family manufacture wool and flax into cloth, and make utenfils of hufbandry fufficient for their own ufe. The principal exports of this country confift of various kinds of lumber, fuch as pine-boards, fhip-timber, and almoft every fpecies of fplit timber manufactured from pine and oak, which are exported from the various harbours in large quantities. Dried fifh alfo furnifhes an article of export, and alfo pickled fifh, fuch as falmon, fhad, &c. Mountain and bog-iron ore are found in fome parts, and works have been erected for its manufacture. A fpirit of literary improvement has been lately excited in this diftrict. Bowdon college in Brunfwick is in a profperous ftate. (See College.) Academies have been incorporated by the legiflature in Hallowell, Berwick, Fryeburg, Bath, Hamden, and Machias, and endowed with grants of the public lands; and another has been inftituted at Portland. Town fchools are alfo maintained in moft of the towns and in many of the plantations.

The people of this diftrict are diftinguifhed by no peculiar features from their neighbours in New Hampfhire and Vermont; but they are, like them, a brave, hardy, enterprifing, induftrious, hofpitable people. The prevailing religious denominations are Congregationalifts and Baptifts; and there are a few Quakers, Methodifts, Epifcopalians, and Roman Catholics. The remains of the Penobfcot tribe are the only Indians who refide in this diftrict: they confift of about 100 families, and live together in regular fociety, at Indian Old Town, which is fituated on an ifland of about 200 acres, on Penobfcot river, juft above the Great Falls. They are Roman Catholics, and conduct their worfhip in an orderly manner and without moleftation. The conftitution of Maine is the fame with that of the Maffachufetts, both being incorporated under one government. In the diftrict of Maine are large tracts of land belonging to the ftate, called the Eaftern lands. Of thefe lands the commonwealth have fold as much as has brought into the treafury a net balance of 269,005*l.* 8*s.* 2*d.* Exclufive of thefe lands, that have been fold, tracts for the encouragement of literature and other ufeful and humane purpofes have been granted to the amount of 431,000 acres.

The firft attempt to fettle this country was made in 1607, on the W. fide of Kennebeck river, near the fea: but this proving unfuccefsful, attempts for this purpofe were not renewed till between the years 1620 and 1630. In 1635 fir Ferdinando Gorges obtained a grant from the council of Plymouth of the tract of country between the rivers Pifcataqua and Sagadahfek or Kennebeck, and up Kennebeck fo as to form a fquare of 120 miles: and fir Ferdinando is fuppofed to have firft inftituted government in this province. In 1639 Gorges obtained from the crown a charter of the foil and jurifdiction, containing as ample powers as were ever granted by the king of England to any fubject. In this year he appointed a governor and council; and government was adminiftered in this form until the year 1652, when the inhabitants fubmitted to the Maffachufetts, and in 1691, by a charter from William and Mary, the province of Maine, and the large territory eaftward, extending to Nova Scotia, was incorporated with the Maffachufetts Bay; fince which time it has been governed and courts held as in other parts of Maffachufetts. Several propofals have been made for feparating this diftrict from the Maffachufetts; the laft was made in 1802; but the legiflature have not interfered in the bufinefs. Such, however, are the rapid fettlement and growth of this country, that the period when this contemplated feparation will take place, is probably not far diftant. Morfe's Geog.

Maine-*Port*, in *Ecclefiaftical Antiquity*, a fmall tribute, commonly of loaves of bread, which in fome places the parifhioners pay to the rector of their church, in recompence for certain tithes. Cowell.

MAINIS, in *Ichthyology*, a name ufed by Ariftotle, Athenæus, and others of the old Greek writers, for the fifh now called the *mana*, *menerela*, and *menola*. It is a fpecies of the fparus, and is diftinguifhed from all the other fpecies of that genus, by having four large teeth, and a variegated body, ornamented with a black fpot in the middle of the fides. This is the fifh the Narbons call *jafcle*. See Sparus *Mana*.

MAINLAND *of Shetland*, or *Zetland*, in *Geography*, the principal of the Shetland iflands, fituated in the Northern ocean.

ocean. It extends about fixty miles in length from north to fouth, and in fome places is upwards of twelve in breadth. The whole of this ifland may juftly be regarded as a feries of promontories, every part of it being interfected by fmall arms of the fea. Hence fcarcely a fpot is to be found more than three miles diftant from the fhore. The coaft is generally bold and rocky, but the numerous bays with which it abounds form fafe and commodious harbours for the fhipping which have occafion to frequent it. The interior prefents to the view many interefting fcenes, partaking both of the tranquil and of the wild. The latter, however, chiefly predominates; and while fpots of cultivated retirement are comparatively few, the romantic beauties of fimple nature are difplayed in abundance and variety. Numerous hills diverfify the face of the country, and traverfe it in different directions. Of thefe the moft lofty is called Rona's hill, or Mons Ronaldi, and is fituated in the parifh of North Maven. In the ftatiftical work of fir John Sinclair, it is ftated to rife 3944 feet perpendicularly above the level of the fea, but Dr. Edmonfton feems to think its height does not exceed 2000 feet, if indeed it is actually fo much. The view from the fummit of this hill in clear weather is fplendid and magnificent in the extreme. The clufter of iflands fcattered beneath, and curioufly divided by the ocean, afford a profpect infinitely diverfified and agreeable. On the higheft eminence there is a houfe conftructed of four large upright ftones, and two which ferve as a covering for the roof. It is called a watch-houfe, and was probably ufed in remote ages to give notice of any approaching danger. A pyramidal tower of fmall ftones is erected on the top of this hill, which is a land mark to the fifhers all round the country, and generally the firft land defcried by fhips if they fall to the weft of the ifland, as they approach it from the north.

The climate of the Mainland is extremely variable and damp, although by no means generally unwholefome to the inhabitants. Spring can fcarcely be faid to commence until April, and there is but little general warmth before the middle of June. The fummer ufually terminates with Auguft. Autumn is a very uncertain feafon, and winter commences as early as the beginning of October. The foil of Mainland is no lefs various than the climate. The arable land lies chiefly on the coaft, and bears but a fmall proportion to the wafte and uncultivated parts, though its productivenefs might be greatly increafed by labour and exertion. The only grains fown are a fpecies of barley, known by the name of beer or big, and a fmall kind of black or grey oats. Potatoes are raifed in confiderable quantity. The manure chiefly in ufe is fea weed, fometimes alone, but oftener mixed with earth or dung from the *byres*, or cow-houfes. Though lime-ftone is fufficiently abundant as well as the means of burning it, it is feldom employed. This is a matter of deep regret, as on thofe fpots where it has been tried, the increafe of fertility has much exceeded expectation. In confequence of this inattention of the natives to the management of their grounds, the vegetable products of the ifland are far from being adequate to its confumption. Hence the neceffity of importing confiderable quantities of grain from other more prolific diftricts. Carts are fcarcely known here, for the beft of all reafons, that there are no roads made by art in any part of the country. The conftruction of their ploughs is extremely rude, being in all probability of the fame defcription with thofe ufed in ancient times over the whole of Europe. They confift of a crooked piece of wood bent (naturally) almoft to a right angle, forming the beam, to which is fixed an oak ftaff about feven feet long, which is very pliable, and yields to the preffure of the driver's hand when he wifhes to deepen the furrow. The coulter ftands almoft even up and down, and is never of fufficient length. A fquare hole is cut through the lower end of the beam, wherein the mercal, a piece of oak about twenty-two inches long is introduced. The furrow is rendered deep or fhallow by driving a wedge below or above the mercal, on the outfide of the beam. The man who holds or governs the plough walks by its fide, and directs it by a ftilt or handle. The driver, or guide, precedes the oxen, ufually four in number, and draws them along by means of a rope faftened to their horns. The other agricultural implements correfpond to the mean conftruction of the plough. Owing to the limited extent of many farms the ground is very often dug with fpades. Seeding time commonly begins here about the middle of March, but it varies in different parts of the country. It is earlieft in the parifhes of Tingwall, Whitenefs, Weefdale, and Dunrofsnefs, where the foil is drier than in moft other places, and has a limeftone bottom. With refpect to the period of harveft, the feafons are fo various, as to render it impoffible to fay any thing precife concerning it, being fometimes over by the middle of September, and at other times fcarcely finifhed in November. When it happens to be thus late, the crop affords little fuftenance to man, and is only valuable as fodder for the cattle. The whole lands of the ifland nearly remain without inclofures. The cultivated lands are divided, but the extenfive hill paftures remain in common. For the divifion of thefe many propofals have been offered, but the attempt has hitherto proved abortive, and indeed it muft be confeffed, that upon the prefent Shetland fyftem of agriculture fuch an event would be attended with very little advantage, unlefs proper fences were conftructed, or fhepherds appointed to confine the fheep or cattle within any prefcribed boundaries. It is fomewhat remarkable that not a fingle tree is to be feen in the whole ifland, and ftill more extraordinary that no proper attempt has been made to afcertain whether the climate will permit their growth. Certain it is, however, that in early ages they muft have reached confiderable perfection here, as many decayed trunks of large trees are often found among the bogs and moffes.

With refpect to the domeftic animals of the Mainland of Shetland, it is well known they are the fmalleft of any in the Britifh dominions; a circumftance doubtlefs the confequence of their fcanty fupply of food, and the total difregard manifefted by the inhabitants for the improvement of their native breed. Some attempts have indeed been made by a few individuals to introduce breeds from more fouthern countries, but the climate of this northern region has been found unfavourable to the animals of warmer latitudes. The number of horfes reared here is very confiderable. They are generally about nine or ten hands high, full of fpirit, and better calculated to endure fatigue than much larger horfes. They are ufually denominated Shetland ponies, and are evidently fprung from the Norway horfe. Thefe animals are never put into a houfe, either in fummer or winter, nor do they receive any food but what they gather from the ground. The horned cattle are greatly inferior in every point of view to thofe of Orkney or the Weftern ifles of Scotland. The cows give very little milk; but as a great portion of the rents was of old paid in butter, now converted into money, it feems reafonable to conclude either that cows were formerly more numerous here, or produced greater quantities of milk than at prefent. Cheefe is feldom made, and indeed a great many of the farmers are yet ignorant how to manufacture it. Their method of making butter is peculiar to the Shetland iflands: Red-hot ftones are thrown into the churn juft at the time when the butter is about to feparate from the ferum, after which the churning is continued till the butter feparates, and rifes to the furface. The number of cattle in the whole ifland is eftimated at about 40,000 head. Swine are bred in great plenty, and are particularly remarkable for the extreme fhortnefs of their backs. The fheep are of different breeds, two of which produce a very fine wool, manufactured by the inhabitants into ftockings. Thefe animals feed at large on the hills, each proprietor having a peculiar mark upon them, to diftinguifh whofe property they are. The alertnefs of the inhabitants, and the fagacity of their dogs, in tracing and feparating their own flocks from the general ftock, are fubjects of wonder to every ftranger who vifits the Mainland.

In this ifland there are very few goats, and no hares or foxes: and in general few wild or ravenous quadrupeds of any kind. Tame and wild fowls, however, exift here in great abundance, particularly the latter; fome of which are extremely deftructive to the young lambs. By the police of the country, every perfon who kills an "erne" is entitled to a reward of *3s. 4d.*: for a corbie or raven he receives *3d.*; and for a crow *2d.* Thefe rewards are paid by the commiffioners of the land-tax, upon feeing the heads of the fowls that have been killed. The number of migratory birds which frequent the rocks on the coaft is immenfe, and though they build their nefts on the brink of precipices feemingly inacceffible, the inhabitants, difregarding the danger of the attempt, plunder them both of their eggs and young.

The mineralogy of this ifland, though of little importance for the purpofes of common life, prefents many interefting objects of contemplation to the geologift. Rocks of primary and fecondary formation can be diftinctly traced in moft places, and offer a variety of fatisfactory illuftrations of the Neptunian theory. Volcanic appearances are extremely uncommon, and purely adventitious. The hills chiefly run in ridges, or appear conical and detached. Except in the parifh of North Maven, there are few of them of the rugged or abrupt kind. Sumburgh-head, a bold and lofty rock at the fouthern extremity, is compofed entirely of indurated fandftone, and the fame material appears to form the coaft along the greater part of the peninfula of Dunrofsnefs. The cliffs of Coningfburgh are compofed chiefly of micaceous fchiftus, as are likewife the hills which bound the valley of Quarf. The coaft of North Maven prefents a grand difplay of natural beauties, the rocks affuming a variety of curious forms from the excavations of the fea. Rona's-hill, on the northern portion of this parifh, is an immenfe mountain of granite, and all the rocks on its weftern boundary are compofed of the fame foffil. About a hundred and fifty feet from the fhore, here ftands a very lofty rock or holm, the fides of which are perfectly mural. It is called Maiden Sherrie, and has never yet been trod by human foot, the black gulls maintaining it in exclufive and unmolefted poffeffion. Near Lerwick, the rocks are a mixture of fandftone and breccia. Limeftone is found in confiderable abundance near Coningfburgh. Beds of the fame mineral ftretch along Weefdale, as well as throughout the whole valley of Tingwall; in all which places it is wrought, and forms an article of exportation. Some ftrata of iron ore have likewife been difcovered in different parts of the country, and attempts have even been made to open mines, but none of them have yet proved fuccefsful.

The only remains of antiquity worthy of notice are what are called Picts'-houfes, and thefe abound in every diftrict of the ifland. They are ufually about fourteen feet high, but differ in the extent of their circumference at the bafe. The interior confifts of feveral cells or apartments, one of which, fituated in the centre, is of much larger dimenfions than any of the others. All of them are conftructed of large flat ftones, without any cement or mortar.

The only villages in the Mainland are Lerwick and Scallaway. The latter is the more ancient of the two, but the former the more confiderable. Lerwick is fituated on the Breffay found, long the general rendezvous of the Dutch fifhing-veffels; and, being the feat of the courts of juftice, is efteemed the capital of the Shetland iflands. See Lerwick and Scallaway.

As to the inhabitants of this ifland, the inferior claffes are ufually reprefented as depreffed and miferable. Both the men and women are, generally fpeaking, well proportioned, of fair complexion, and an agreeable expreffion of countenance. Great attention is paid by them to the growth of the hair, which is valued in proportion to its length. The peafantry are noted for their curiofity and acutenefs; but the acquifition of ufeful knowledge is feldom the object of their inquiries. Some of them, however, have excelled in the mechanical arts by the mere force of natural genius alone, unaided by education or example. Dr. Edmonfton mentions a blackfmith, who was completely mafter of clock and watch-making in all its branches, although he had probably never witneffed any part of that delicate manufacture. Small as their country is, a confiderable variety of manners and habits is difcernible in different diftricts; the inhabitants of fome parifhes being remarkable for their gaiety, and others no lefs fo for the gravity and fobriety of their deportment. Sufpicion, indolence, and fervility are qualities too generally diffufed among them, the confequence, no doubt, of the immemorial operation of feudalifm. Belief in witchcraft, fairies, and the efficacy of alms, is alfo ftill prevalent over the whole ifland, and freemafonry is univerfally confidered as conferring upon its votaries the rare faculty of detecting theft.

The manufactures carried on here are but few, and thefe in general imperfectly conducted. The knitting of worfted ftockings, caps, and gloves by the women, is among the moft ancient. Shetland hofiery has long been held in high repute, and formed a confiderable article of exportation. The demand for it has of late years, however, confiderably diminifhed even in the Britifh iflands, and fcarcely any of it now reaches the continent. A fort of coarfe cloth or claith is wove here by individual weavers, as well as blankets for home confumption. Kelp is now a ftaple manufacture, and at Lerwick there is both a ftraw and a rope manufactory. The chief employment of the inhabitants, however, and the principal fource of their wealth, are the fifheries eftablifhed on their coafts, which abound with herring, cod, tufk, and ling. The Dutch formerly owed to their Shetland fifheries in no fmall degree the elevated ftation their country held during the two laft centuries, among the nations of Europe. Almoft all the land proprietors here are engaged in this traffic, and as more profit arifes from it than from their eftates, their lands are made fubfervient to its profecution. Hence in fome meafure proceeds the low condition of hufbandry, and the dependent obfequioufnefs of the common people. Every laird endeavours to eftablifh on his eftate as large a number of perfons as he poffibly can, as he thereby obtains a greater number of fifhermen. Farms are therefore divided and fubdivided; and wafte lands allotted to all who are willing to fettle on them. The facility of obtaining poffeffions encourages marriage, and as a confequence, the population of the ifland is much greater than it can fupport. The young men being burdened with more numerous families than they can well fupport, find themfelves fpeedily involved in difficulties. Having no leafes of their poffeffions, and all the fifh they take belonging to the landlord at a fixed price, a ftate of ab-

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ject dependence on their ſuperiors may be reaſonably concluded to exiſt; and it actually does exiſt over the whole of Shetland. The chief exports from the iſland are, fiſh, oil, butter, beef, hides, tallow, ſtockings, calf, and rabbit-ſkins. The imports conſiſt of the luxuries, and even neceſſaries of life, particularly cloth and corn; the whole iſland, as already hinted at, not producing grain ſufficient to ſupply the inhabitants more than eight months in the year. For a more particular account of the Mainland, and a view of its general hiſtory, ſee the article SHETLAND *Iſles*, alſo "A View of the ancient and preſent State of the Zetland Iſlands," by Arthur Edmonſton, M.D. 2 vols. 8vo. 1809.

MAIN-MORTE, a term in ſome ancient cuſtoms, ſtill obtaining in Burgundy, ſignifying a right which the lord has, on the death of a chief of a family that is *main-mortable*, of taking the beſt moveable in the houſe; or, in default of that, the right hand of the deceaſed was offered him, in token that he could ſerve him no longer. See MORTMAIN.

MAINO JASON, DEL, in *Biography*, an eminent Italian lawyer, born at Peſaro in 1405, was ſent to Pavia to ſtudy the law, having received the elements of a good education in his native place. Free from the conſtraint of parental obſervation, he applied himſelf more to the gaming table than to thoſe purſuits which were intended to fit him for future life. By this line of conduct he was ſoon reduced to a ſtate of almoſt abſolute indigence. The animadverſions of his father, together with his own ſufferings, effected ſuch a change in his mode of living, that he became the admiration of his ſuperiors on account of his learned acquiſitions. In 1467 he was elected a profeſſor at the univerſity of Pavia, and continued there with high reputation till the year 1485, when he accepted a profeſſorſhip at Padua. In 1488 he removed to the univerſity of Piſa, to which the republic of Florence invited him, on a very liberal ſalary. After this he reſumed the profeſſor's chair at Padua, where his reputation was ſo high, that he is ſaid to have had three thouſand auditors. Beſides the duties of his office as teacher, he tranſacted much public and important buſineſs with accuracy and fidelity. In 1492 he was ſent by the duke of Milan to do homage to pope Alexander VI., on which occaſion he pronounced an oration that was afterwards printed. He was, in 1494, ſent to compliment the emperor Maximilian on his marriage, and on this occaſion he was rewarded with the title of cavalier and count-palatine: and next from Ludovico, duke of Milan, he obtained the rank of patrician, and honorary poſt of ſenator. Lewis XII. of France, attended by five cardinals, paid a viſit to his ſchool; Jaſon, in introducing his majeſty, humbly requeſted him to enter firſt, to which Lewis replied, "I am no king here," and obliged the profeſſor to precede, he being entitled to the chief reſpect among his ſcholars. After the lecture the king embraced Jaſon with the utmoſt cordiality, and in the courſe of a familiar converſation, he hinted to his majeſty, that he might favour him, by mentioning his name to the pope as not diſqualified to wear a cardinal's hat. He was, however, unable to attain to the object of his ambition, and continued to hold his office as profeſſor till the year 1511; after this he fell into a ſtate of dotage, in which he continued till he died in 1519. This gentleman was eſteemed one of the greateſt maſters of juriſprudence in his time, and is mentioned by Alciatus among the five juriſts who alone deſerve to be read. Gen. Biog.

MAINOUR, MANOUR, or *Mainor*, Fr. *Mainveuvre*, *a manu*, in *Law*, ſignifies the thing that a thief takes away, or ſteals.

Thus, to be taken with mainour, is to be taken with the thing ſtolen about him. If the defendant were taken with the mainour, and ſo carried to court, in ancient times they would arraign him on the mainour, without any appeal or indictment. But this proceeding was taken away by ſeveral ſtatutes in the reign of Edward III., though in Scotland a ſimilar proceſs remains to this day. See ATTACHMENT *of the Foreſt*.

MAINPERNORS. See MAINPRISE.

MAINPRISE, compounded of the French *main*, *hand*, and *pris*, or *prins*, *taken*, the taking or receiving a man into friendly cuſtody, who otherwiſe might be committed to priſon; upon ſecurity given for his forthcoming at a day aſſigned.

They who thus undertake for any one, are called *mainpernors*, becauſe they receive the perſon into their hands; whence alſo comes the word *mainpernable*, denoting the perſon who may be thus bailed. F. N. B. 250. 1 Hal. P. C. 141. Coke on bail and mainpriſe, c. 10. See BAIL.

The writ of mainpriſe is a writ directed to the ſheriff, (either generally, when any man is impriſoned for a bailable offence, and bail hath been refuſed; or ſpecially, when the offence or cauſe of commitment is not properly bailable below), commanding him to take ſureties for the priſoner's appearance, and to ſet him at large. Mainpernors differ from bail, in that a man's bail may impriſon or ſurrender him up before the ſtipulated day of appearance. Mainpernors can do neither, but are barely ſureties for his appearance at the day: bail are only ſureties, that the party be anſwerable for the ſpecial matter which they ſtipulate: mainpernors are bound to produce him to anſwer all charges whatſoever. Coke, *ubi ſupra*, c. 3. 4 Inſt. 179.

MAINTAINERS, are thoſe that maintain or ſecond a cauſe depending between others, by diſburſing money, or making friends for either party, &c. not being intereſted in the ſuit, or attornies employed therein. Stat. 19 Hen. VII. cap. 14. See MAINTENANCE.

MAINTENANCE, MANUTENENTIA, an unlawful maintaining, or officious intermeddling in a ſuit between others, by aſſiſting either party with money or otherwiſe, to proſecute or defend it. Hawk. P. C. 249.

The word is metaphorically taken from the ſuccouring a young child, that learns to go by one's hand; but it is uſed in the bad ſenſe in ſome of our ſtatutes.

By the Roman law, it was a ſpecies of the *crimen falſi* to enter into any confederacy, or to do any act, to ſupport another's law-ſuit, by money, witneſſes, or patronage. A man may, however, maintain the ſuit of his near kinſman, ſervant, or poor neighbour, out of charity and compaſſion, with impunity; otherwiſe the puniſhment by common law is fine and impriſonment; and by ſtat. 32 Hen. VIII. cap. 9. a forfeiture of 10*l*. See BARATRY and CHAMPARTY.

There lies a writ againſt a *maintainer*, called a writ of *maintenance*.

MAINTENON, FRANCES D'AUBIGNE, in *Biography*, celebrated in the hiſtory of France as well for her great accompliſhments, as for the ſingularity of her fortunes, was born in a priſon at Niort in the year 1635. In this ſolitary abode her father, Conſtant d'Aubigné, was confined for ſome political offence. Here he and his infant daughter remained during the firſt three years of her life, at which time her father, having obtained his liberation, carried her with his wife and ſon to Martinique. She was indebted to her mother for an excellent education, that was unqueſtionably the baſe of her future elevation. On the death of her father, in 1647, the family returned to France, when the young lady was taken under the care and protection of madame de Villette, who infuſed into her mind thoſe principles of the Calviniſtic faith

faith to which her father had been zealoufly attached. Her mother, who was a ftrict Catholic, took great pains in converting her to her own opinions, which fhe effected. They removed to Paris, where the mother very foon died, leaving her children in the greateft indigence. Frances, from this circumftance, and from the feverity of fome other near relations, was induced to give her hand to the famous Scarron, who was not young, and who from difeafe was in a ftate of decrepitude. She accepted this union, it is faid, rather than the other alternative which he offered her, of paying her portion to be received into a nunnery. The houfe of her hufband was frequented by many men of rank and wit, and the young wife attracted general admiration by the graces of her perfon, and the elegant charms of her converfation. In this dangerous fituation fhe conducted herfelf in fuch a manner, that her virtue was unfullied and unfufpected. Her intimacy with the celebrated Ninon de l'Enclos did not in the leaft injure her reputation, and the teftimony of her friend, in favour of her morals, has been admitted as good evidence. Scarron died in 1660, and his widow was again left in a ftate of indigence: for a fhort time, and after much folicitation, fhe obtained from the queen-mother the penfion which her late hufband had enjoyed; but at the death of the queen, fhe was again deftitute. At this time a propofal was made to her to go to Lifbon to undertake the education of the children of a Portuguefe princefs. She gladly liftened to the propofal, and juft before her intended departure fhe waited upon the king's miftrefs, madame de Montefpan, who, ftruck with the elegance of her manners, and the graces of her converfation, told her fhe muft not think of quitting France. She immediately applied to Lewis XIV. for a penfion to be fettled on the forlorn widow, to which the monarch angrily replied, "fhall I never hear of any thing but the widow Scarron." Indeed, fire, replied the favourite, "you ought long fince to have ceafed to hear of her." The penfion was, however, granted, and fhe remained in France. Madame de Montefpan, who had now ftrong claims to her gratitude, conceived fuch an efteem for her, that fhe entrufted her with the fecret of the children which fhe had by the king, and placed them under her care. At firft fhe had the mortification to find that Lewis was not friendly to her. Her talents, however, were fuch as time would bring into notice, and fhe gradually rofe into favour, and was chofen by the monarch himfelf to attend his eldeft fon, by madame de Montefpan, the duke of Maine, to Bareges, for the recovery of his health. This fituation engaged her in a direct correfpondence with the king, a circumftance that operated very ftrongly in her favour: he augmented her penfion, and made her liberal prefents. Her ferene and equal temper, and rational converfation, gradually gained upon Lewis, till at length fhe became his confidential friend. Her age, which exceeded that of the king, the moderate fhare of perfonal attractions which fhe retained, and the ftrictnefs of her religious principles, feem to have been fufficient affurances of the innocence of their connexion. Madame de Maintenon has been charged with ingratitude towards her benefactrefs, who was now difcarded from the court, but fhe has found advocates who have fully vindicated her from the fufpicion. Her fituation with Lewis was, for fome years, equivocal: fhe was an acknowledged favourite, but to what extent was not known; there was a fingular mixture of devotion and gallantry in the correfpondence carried on between the king and his female friend, and in allufion to this, Voltaire obferves; "This ftrange commerce of tendernefs and fcruple on the part of the king, of ambition and devotion on that of the new miftrefs, feem to have lafted from 1681 to 1686, which was the epoch of their marriage. This union was never doubted, though never openly acknowledged at court, and madame de Maintenon preferved that name while fhe was regarded and honoured as a queen. She always conducted herfelf with extreme good fenfe and moderation; was very referved in afking favours for herfelf and family, and in thefe refpects fhe formed a ftriking contraft to preceding favourites. Exceffive caution, amounting to timidity, which appeared to extinguifh every warm and generous emotion, was a characteriftic feature of her conduct. She devoted herfelf entirely to the king, which fhe found to be a tafk that rendered her elevated fituation moft painful and joylefs." "What a punifhment," faid fhe, to a near relation, "to be obliged to amufe a man who is no longer amufable." That her feelings on this fubject were extremely acute, is evident from an extract of a letter to an intimate friend: "Why," fays fhe, "cannot I give you my experience? why cannot I make you fenfible of the wearifomenefs to which the great are a conftant prey, and the labour they undergo to fill up their days? Do not you fee that I am confumed with melancholy, in a condition which it was fcarcely conceivable that I fhould ever have attained." She attempted to fupply the void which fhe felt by the practices of a minute and fcrupulous devotion, and fhe infpired the king with a fimilar tafte; but, at the fame time, fhe was not infenfible to the ambition of ruling, and often exerted her influence when fhe was not fufpected of having an opinion. But fhe found it neceffary to ufe the utmoft circumfpection, for the king would not bear a rival; and if he fufpected any defign to controul his will, he was apt to determine on the contrary. As his infirmities increafed, fhe became more and more neceffary to his exiftence, and is faid to have fhared with his confeffors the poffeffion of his mind to the laft hour. She employed a confiderable portion of a fcanty income in deeds of charity and benevolence, but her moft fplendid work was the eftablifhment at St. Cyr, near Verfailles, including a religious community, and an inftitution for the gratuitous education of 300 young ladies of quality. For this fhe engaged Racine to compofe the facred dramas of Efther and Athaliah, in which the young ladies acted their parts fo well, in the firft reprefentation, that fhe determined they fhould not appear in the characters again. On the death of the monarch in 1715, madame de Maintenon retreated to this peaceful manfion, thenceforth refigning all concern with the great and political world, acting in the laudable duties of the directrefs of the inftitution, and inftructrefs of the young people educated in it. She was occafionally vifited by a few particular friends; among whom her former pupil, the duke of Maine, was always received with the expreffions of truly maternal affection. She lived to the great age of eighty-four, and died at St. Cyr in 1719. She is known in the literary world by a collection of letters in nine vols. 12mo. which were publifhed in 1756; thefe are well written, and contain many things worthy of attention. Gen. Biog.

MAINTENON, in *Geography*, a town of France, in the department of the Eure and Loire, and chief place of a canton, in the diftrict of Chartres; nine miles N. of Chartres. The place contains 1605, and the canton 13,369 inhabitants, on a territory of 205 kiliometres, in 21 communes.

MAJO, FRANCIS, or CICCIO DE MAJO, in *Biography*, a Neapolitan compofer of the firft clafs, who flourifhed from about the middle of the laft century to 1774: his works are few, as longevity was not allowed him. Metaftafio's Artaferfe in 1762, Antigono in 1769, a Didone Abbandonata, and Aleffandro nell' Indie, both thefe laft in 1774, are all his dramatic works with which we are acquainted. He was in very high favour at Naples and Rome in the year 1770,

 when

when natives as well as foreigners were eagerly collecting his opera airs composed for great singers; of which airs the style was noble, the accompaniments elegant and interesting, without disturbing or overpowering the voice, and each air is a more complete whole, perhaps when detached for occasional use at concerts, than those of any other great opera composer with whose productions we are acquainted.

M. Laborde's character of this charming composer is very just; but his dates are far from accurate. Artaxerxes was not the first opera which he composed, but Riccimero, for the theatre Delle Dame at Rome in 1759; and in 1763 his Demofoonte was performed at the Argentina theatre in the same city.

M Laborde tells us, that though he had often gone the rounds of the great theatres in Italy, he never would quit his country; but in 1764, we find by Metastasio's letters to Farinelli, that he was at Vienna in his way to Manheim, where he was engaged to compose an opera.

Farinelli seems to have given him a letter of recommendation to the imperial laureat, in the answers to which we may form some judgment of the private character of this gifted man..

Metastasio, in his first letter to Farinelli, in which Ciccio de Majo is mentioned, says, "Our dear Majo has been arrived some time, but I have seen him but once, and then only for a short time. I received him with all that affection which I cannot help bestowing on persons beloved by you, and whose merit is universally known. Nor shall I neglect any opportunity of serving him, as far as the august circumference of my limited faculties shall extend. The best of it is, that he not only never comes near me, but leaves me in perfect ignorance of the hiding place where he has hitherto amused himself here, during the leisure in which he has hitherto lived. Perhaps some ancient sparks have rekindled the extinguished conflagration, and the poor soul will be involved in the flames and smoke which formerly, as I am informed, scorched and confounded him."

In another letter of the same date, Metastasio says, "Your most amiable de Majo generously gives me credit for wishing to serve him, but hitherto has absolutely avoided putting my zeal to the test. A man of his merit, and your friend, would have a right to dispose of me at his pleasure. But he, who is no fool, knowing perhaps the little extent of my power, is unwilling to expose me to the shame of confessing it. I am unable to inform you whether he has been caught in the old net. I never frequent the woods which expose him to such danger, and have never been able to examine him; as during his long residence on the banks of the Ister, I have only had the pleasure of seeing him two or three times, at most. Indeed his continuing so constantly invisible, and remaining here so long, without any apparent motive, seems to favour your conjectures. If he is at sea, I wish him a prosperous gale; if such a wish is not inconsiderate: as the felicity of a navigation depends much on the cause for which we embark; and I never wish my friends to be possessed of such an inconsiderate courage."

And in a third letter, he says, "Our ardent and languid Majo, stimulated by his friends and by his duty, is at length set off for Manheim, where he is engaged to compose an opera for the elector palatine. With what heart he has left the banks of the Ister, enamoured turtles say!"

This exquisite composer and tender hearted swain, who had he been possessed of the world, would have *lost* it all *for love*, with as good a grace as Mark Antony, died in 1771. The last opera he composed, was Didone Abbandonata, for Venice, in 1770.

Majo *Bamba*, in *Geography*, a town of Peru, in the jurisdiction of Chacapoyas.

Major, John, in *Biography*, was born at North Berwick, in Scotland; he laid the foundation of a learned education in his own country, and afterwards studied some time at Cambridge and Oxford. In 1493 he went to Paris, where he prosecuted his studies at different colleges; in 1505 he was made doctor of the Sorbonne, and in 1519 he returned to his native country, and was elected professor of divinity at St. Andrews, where the celebrated Knox was one of his pupils. He afterwards attained to the office of provost of that university, where he died at the age of seventy-eight, in the year 1547. He was a voluminous writer in metaphysics and logic, but his works on these subjects have long been forgotten, and he is now remembered and quoted only as the historian of his own country. His main work is entitled "De Gestis Scotorum," in six books, first published at Paris in 1521, which bring down the history from the earliest periods to the year 1495. He rejects the fictions of antiquarians relative to the remote history of the nation, and reduces the list of its early kings. He is a strenuous advocate for the independence of his country, and speaks freely of the power of the people and the prerogatives of parliament; he is an enemy to public abuses, and speaks with decision of the acts of the kings whose conduct he never scruples to condemn. Bishop Leslie says of his history "Veritatis ubique quam eloquentiæ studiosior." Gen. Biog.

Major, John Daniel, a physician and naturalist, was born at Breslau, in August 1634. Having studied for some time at Wittemberg, he visited several universities of Germany and Italy, and graduated at Padua in 1660. He returned to Silesia through Austria; but, after a short visit to Breslau, he settled himself at Wittemberg, where he married the daughter of the celebrated Sennertus in 1661, who died in child-bed in the following year. This interruption of his domestic happiness impelled him to leave Wittemberg, and he settled at Hamburgh, where he undertook the office of superintendant of the treatment of the plague. The success of his practice obtained for him, in 1663, the honour of being enrolled among the members of the Academia Naturæ Curiosorum, under the name of Hesperus, and likewise an invitation, through the Russian consul at Hamburgh, to settle at that court, with the appointment of first physician: but he declined this offer, from a dislike to quit his own country, and to reside among a people, whose language and manners were so widely different from those with which he was familiar. In 1665, he was appointed professor of the theory of medicine in the recently established university of Kiel; and he was afterwards honoured with the appointments of professor of botany, and director of the botanic garden there. These offices called forth the exertion of his utmost zeal, in support of the reputation and utility of the rising university, which he essentially contributed to establish by his travels and researches, and by the valuable collections with which he enriched it. By these exertions his own reputation was likewise extended, so that in 1693, he was called to Stockholm by Charles XI. to superintend the treatment of the disorder of his queen. But he was himself attacked with disease, while in that capital, which terminated his life on the third of August, in that year.

Major was indefatigable in his researches, both in natural history and medicine, and was the author of a considerable number of publications: Eloy has enumerated the titles of upwards of twenty works, exclusive of a number of academical dissertations. The principal subjects of the former were,

were, petrifactions or fossils, renal calculi, transfusion, anatomy, botany, artificial medicated baths, &c. Eloy Dict. Hist. de le Méd.

MAJOR's *Bay*, in *Geography*, a bay of the island of St. Christopher. N. lat. 17° 20'. E. long. 62° 22'.

MAJOR, in *Law*, a person who is of age to manage his own affairs. See AGE.

By the civil law, a man is not a major till the age of twenty-five years; in England, he is a major at twenty-one, and in Normandy at twenty.

MAJOR, in *Logic*, is understood of the first proposition of a regular syllogism.

It is called *major*, because it has a more extensive sense than the *minor* proposition, as containing the principal term. See PROPOSITION.

MAJOR, in the *Art of War*, a name given to several officers of different qualities and functions.

MAJOR-*general*. See GENERAL, *Major*.

MAJOR *of a Brigade*, either of horse or foot, is he who receives orders, and the word, from the major-general; and gives them to the particular majors of each regiment. See BRIGADE-*major*.

MAJOR *of a Regiment* is an officer, whose business is to convey all orders to a regiment, to draw it up, and exercise it, to see it march in good order, to look to its quarters, and to rally it, if it happen to be broken in an engagement, &c.

The major is next in subordination to the lieutenant-colonel, and generally promoted from the eldest captain. He is the only officer of a regiment of foot, who is allowed to be on horseback in the time of service; but he always rides, that he may speedily get from place to place, as occasion requires.

The major of a regiment, either of foot or of horse, ought to be a man of honour, integrity, understanding, courage, activity, experience, and address; he should be skilled in arithmetic, that he may keep a detail of the regiment in every particular, and also in horsemanship; and he should be well acquainted with all military evolutions, that he may be competent to the exercise of his duty in the instruction of others.

MAJOR *of Artillery* is the next officer to the lieutenant-colonel. In the field he receives daily orders from the brigade-major, and communicates them, with the parole, to his superiors, and then dictates them to the adjutant.

The whole detail of the corps rests with this officer; to him all the non-commissioned officers are subordinate, as his title of serjeant-major imports, and to him they communicate an account of every circumstance that regards the duty or the wants of the artillery and soldiers. This officer should be well acquainted with all the powers and evolutions of the artillery, and with every thing that pertains to the train of artillery, &c.

MAJOR *of Engineers*. See ENGINEER.

MAJOR, *Serjeant*, is a non-commissioned officer, subordinate to the adjutant, as he is to the major.

MAJOR, *Town*, is the third officer in order in a garrison, being next to the deputy-governor.

He ought to understand fortification, and hath charge of the guards, rounds, patroles, and centinels.

There are also aids-major, drums-major, and other officers; so called, on account of some seniority or prerogative that they have over the rest. See AID-*major*, and DRUM-*major*.

MAJOR, *Fife*, has the same authority over the fifers as the drum-major has over the drummers. He teaches them their duty, appoints them for guards, &c.

MAJOR *Helicis*, in *Anatomy*, a name given by Albinus to one of the muscles of the eye, called by Santorini and others, helicis musculus. This author distinguishes it under the name *major*, from another muscle which he calls the *minor helicis*, and which Santorini calls only fibræ musculares in plana helicis facie, though it be a true and proper muscle.

MAJOR *and Minor*, in *Music*. See MAGGIORE.

MAJORAGIO, MARCANTONIO, in *Biography*, an Italian scholar of the sixteenth century, was born in a village of that name in the diocese of Milan. His father's original name was Conti, and he assumed the name of the place in which he settled, and to which he had been driven and reduced to poverty by the wars in Lombardy. The subject of this article was indebted to a relation for his education, whose cares he well repaid, by the diligence with which he pursued his studies. One of his preceptors was the famous Cardan, and such was his proficiency, that at the age of twenty-six he was appointed public professor of eloquence at Milan. He afterwards, on account of new wars, was obliged to go to Ferrara, where he improved himself in philosophy and jurisprudence. At the return of peace he resumed his station at Milan, and contributed greatly to revive the study of letters by restoring the practice of public declamations, by promoting the establishment of an academy, and by his attempts to found a public library. He died in 1555, at the age of forty-one. His works are numerous, consisting of orations, prefaces, poems, Latin and Italian, and tracts on various subjects. He employed his talents as a commentator on the works of Cicero and Aristotle. Bayle.

MAJORANA, in *Botany*, so called, says Ambrosinus, because it is cultivated with greater care (*majori curâ*) than other herbs; or because it has greater virtues and properties than are generally known; or because it is most powerful in the month of May; or because it agrees better with grown up persons (*majoribus*) than with infants. None of these derivations seems satisfactory. The plant however appears to be properly considered as the "*mollis Amaracus*" of Virgil, immortalized in those exquisite lines of the Æneid, book i. l. 695—8, inaccurately and incompletely translated by Dryden, who seems to take the *Amaracus* for Myrtle. These lines are indeed, as has been observed, the despair of all Virgil's translators. See ORIGANUM.

MAJORCA, in *Geography*, an island of the Mediterranean, belonging to Spain. It is the largest of the Balearic isles, and reckoned to be about 55 English miles in length, and 45 in breadth; and separated from Spain by about 40 leagues of sea. It is almost wholly surrounded by a chain of mountains, of which an interrupted branch extends into the interior; those of Puig Mayor and Galatz are the highest and most considerable. The climate is temperate; the fresh breezes tempering the heat of summer, and on the eastern coast little cold is felt in winter; but the temperature varies in different situations. But though it is well sheltered on the north, some winds occur, which sometimes entirely destroy the plantations. The vallies are fresh and fertile, though without water. However, some large brooks spring from the vicinity of the mountains, and run through some parts of the island; and two small rivers, particularly the Rierra, which rises under the ramparts of the capital. This island contains two cities, Palma and Alcudia, several small towns, and many hamlets. A Spanish author assigns to it two cities, 32 towns, a number of remarkable villages, 2001 farms, 1877 country houses, 10 castles or fortresses, 40 towers, where centinels are placed with fires during the night, to give alarm in case of danger, and 210 brooks or springs. The capital is Palma, or, as it is otherwise called, Majorca.

The kingdom of Majorca, comprehending the ancient Iberian iſlands, or the Balearic and Pituyſe, loſt much of its ancient population in the year 1229 by the defeat of the Moors, and the carnage made by the Chriſtians, in order to revenge the death of the celebrated viſcount de Bearn, William of Moncade, and his brother. In the year 1301 the Jews, who had been driven from Spain on account of their exactions and uſury and ſettled here, were baniſhed from the iſland. About the beginning of the 15th century, Majorca was afflicted with famine for 10 years, and its commerce declined with its population. In 1403 the river Rierra carried away 1600 houſes, and drowned 5500 perſons. A ſimilar cataſtrophe occurred in 1408 and 1444. Theſe diſaſters were ſucceeded by a civil war. In 1475 the iſland ſuffered great devaſtation from the plague. By theſe and other occurrences the population of Majorca was much diminiſhed; but in this ſtate it furniſhed troops for a militia, raiſed in order to defend the coaſt againſt the incurſions of the Barbarians. The nobility of Majorca was formerly conſiderable; and in the middle of the 16th century they engaged againſt the Africans, who endeavoured to invade the iſland. But after this epoch it enjoyed much internal tranquillity, though it never roſe to that eminence, which it is ſaid to have attained under the Moors. The number of inhabitants is now eſtimated at about 136,000 perſons, among whom are reckoned 1950 ſecular prieſts, 1000 monks and hermits, 600 cloiſtered nuns, and 600 women voluntarily engaged in charitable inſtitutions.

The agriculture of Majorca is in a flouriſhing condition. The mildneſs of the climate, and the fertility of the country, has given to the iſlands of this kingdom the name of the "Fortunate Iſlands." (Strabo, lib. iii.) The groves of orange trees produce excellent fruit, and the vines are loaded with grapes. The mountains in general are covered with trees of various kinds, as firs and holm-oaks, fit for carpenters and ſhip-builders; and the wild olives are abundant. The plains and vallies, which are well watered, exhibit the appearance of meadow ground. The flocks furniſh a great quantity of the fineſt wool; and by the culture of mulberry trees, they feed a number of ſilk worms, whoſe produce ſerves not only for domeſtic uſe, but promiſes to afford an article of exportation. In ſome territories they cultivate ſeveral kinds of corn, and delicious figs, which are dried; in others they graze cattle. The plain between Felonice, Montuyri, San Juan, and Petra is conſidered as the granary of the iſle. Corn, wine, oil, freſh and dried figs, and brandy, ſupply the wants of the interior. The eaſtern valley of Alcudia is very fruitful and rich. Grains of different ſpecies, honeycombs, olives, carobs, hemp, and every variety of fruits and herbs, are abundant. The valley of Soler is famous for its beauty and fertility, and is the pride of the iſlanders; and the canton of the mountains of Bagnabufar abounds in wine and flax, which are alſo produced in many other parts of the iſland. The Majorcans, however, are reproached with a laſſitude injurious to their proſperity. They import as much as 50,000 fanegas of wheat to ſupply the conſumption of 136,000 inhabitants, who poſſeſs a territory of 1234 ſquare miles, which are ſuppoſed to be the extent of the iſland. The Majorcans manufacture a ſort of coarſe ſtrong cloth for their own uſe, and a large quantity of corded woollen ſtuff, which is exported into Catalonia and the kingdom of Valencia. They have alſo looms for tapeſtry, blankets, and ſaſhes, all in wool, exported to Malta, Sardinia, Valencia, and even to America. They manufacture ſilk in the iſland, and make ſeveral ſtuffs uſed by the inhabitants, as well as linen cloths, ſome of which are very fine. The coarſe canvas, which they fabricate for the uſe of the marine, is exported. They make brooms, paniers, and baſkets, out of the leaves of the palm-tree, which are tranſported into Spain. Theſe iſlanders have been famous for their inlaid work, and this branch of commerce is profitable. The wines of Majorca are excellent. The lighteſt and fineſt, though friſky and delicate, are Muſcadel, Malvoiſia, Pampot Roda, and Montona. The oxen are ſmall and feeble; the ſheep large, with beautiful and heavy fleeces. The pigs are large and fat; game is very plentiful, and conſiſts of hares, rabbits, ſnipes, partridges, quails, &c. Poultry is very common. Their cheeſe is made of goats' and ſheep's milk, and ſome of it is very good. Their exports, conſiſting of oils, wines, brandy, oranges and lemons, almonds, cheeſes, capers and beans, amount in value to about 508,732*l.* 1[illegible]*s.* 4*d.* This ſum is augmented by the produce of ſome articles of manufacture. The inhabitants receive, in return, corn, ſalt proviſions, ſugar, coffee, rice, different ſorts of ſnuff, cloth, ſilk ſtuffs, linens of different qualities, hoſiery, hardware, medical drugs, planks and building wood, powder and ſhot for ſporting, &c. all which may amount to the value of 124,833*l.* 6*s.* 8*d.* ſterling. Hence it appears, that the balance in their favour amounts annually to about 383,899*l.* 11*s.* 8*d.* ſterling.

The iſland of Majorca is not only deſtitute of navigable rivers, but its highways are inconvenient for travelling, and very much out of repair; ſo that all the articles of land carriage, from the interior to the ſea, are conveyed on the backs of mules, or by carts of very clumſy conſtruction. It has been ſaid, that mines of gold and ſilver and precious ſtones were formerly found in this iſland; but of this there now remains no evidence. Its quarries of various ſorts of marble and of ſtone are, however, numerous. In the marſhes of Campos a quantity of natural ſalt is diſcovered, but for want of being worked it turns to little account: near the ſame town is a ſpring of ſulphureous water, called the holy, or St. John's fountain, which is reckoned ſalutary in various complaints. In this iſland are ſome birds of prey, particularly the hawk; but venomous animals are very little known. The coral fiſhery is carried on in the bay of Alcudia during the months of July and Auguſt.

The manners of the Majorcans are the ſame with thoſe of the Spaniards, and moſt ſtrikingly reſemble the Catalonians; they are both excellent ſoldiers and ſailors. The dreſs of the peaſants is a cap, which covers their ſhort hair, a jacket down to the waiſt, large breeches, and ſhoes tied with a ſtring; above the breeches they have a ſort of frock. The neat and ſimple head dreſs of the females is called "rebozillo;" it conſiſts of a double handkerchief, the upper part of which covers the head, and is hid under the chin, leaving only the face expoſed, then extending over the ſhoulders, and falling down half of the back, the two ends meet, croſs, and are tied before. Among the wealthy the rebozillo is an expenſive article of dreſs, on account of the embroidery and lace. The women are in general fond of ornaments; thoſe of fortune having a gold chain hanging along the petticoat, and ſometimes a chain of the ſame metal from the corſet, to which is fixed a valuable medallion: they have alſo all their fingers covered with rings, and make uſe of watches, bracelets, and other trinkets. When they go abroad, they wear a mantle like thoſe in Spain, and carry in their hands a fan and a long chaplet, ornamented with gold beads, and a croſs of the ſame metal.

The Majorcans value themſelves on their fidelity to their ſovereign; they are devout without bigotry, and their manners are ſoft and prepoſſeſſing. The women have a great degree of natural elegance.

Perſons

Perſons of diſtinction, men of buſineſs, and merchants ſpeak Caſtilian, but the language ſpoken among the reſt of the iſlanders is a kind of mixed jargon, the origin of which it would not be eaſy to trace. The authors, who have written on the Balearic iſlands, ſay, that the Limouſine tongue is uſed, but this language is merely a dialect differently pronounced, and ſpoken in the ſouthern provinces of France. The Balearic conſiſts of Greek, Latin, Arabic, Catalonian, Languedocian, and Caſtilian, intermixed with Syriac, Carthaginian, and Vandal or Gothic words, or rather it is a ſtrange medley of all. De Laborde's View of Spain, vol. iii. See BALEARES *Inſulæ*.

MAJORCA. See PALMA.

MAJOR-DOMO, an Italian term, frequently uſed to ſignify a ſteward or maſter of the houſehold.

The title of major-domo was formerly given in the courts of princes to three different kinds of officers. 1. To him who took care of what related to the prince's table, or eating; otherwiſe called *eleater*, *præfectus menſæ*, *architriclinus*, *dapifer*, and *princeps coquorum*. 2. Major-domo was alſo applied to the ſteward of the houſehold. 3. The title of major-domo was alſo given to the chief miniſter, or him to whom the prince deputed the adminiſtration of his affairs foreign and domeſtic, relating to war as well as peace. Inſtances of major-domos in the two firſt ſenſes are frequent in the Engliſh, French, and Norman affairs.

MAJORIANUS, JULIUS VALERIUS, in *Biography*, an emperor of the weſtern Roman empire, was raiſed to the throne in the year 457, having ſerved with much reputation in the army. His addreſs to the ſenate on this occaſion ſpoke the language of one fully ſenſible of the duties incumbent on him. He appears to have poſſeſſed many excellent qualities both of the heart and head. The laws which he cauſed to be enacted, and which are extant at the end of the Theodoſian code, are proofs of his attention to the happineſs of his ſubjects, and the welfare of the empire. He granted a diſcharge to the inhabitants of the provinces from all arrears of tribute, and removed many exactions in the collections of the taxes. He enjoined ſevere penalties againſt the dilapidation of the public edifices of Rome, and made many wholeſome regulations to encourage marriage, and reſtrain adultery. He rendered himſelf illuſtrious by his victories over the Vandals and Moors, who invaded his territories. He was at length the victim to the ambition of ſome of his chiefs, and compelled to abdicate his throne and authority in the year 461, after a reign of little more than three years; and in a few days after he was maſſacred by Ricimer, one of his generals. His character was that of an active, virtuous, and humane emperor. Univer. Hiſt. Gibbon.

MAIRAN, JOHN JAMES D'ORTOIS DE, an eminent French philoſopher, who flouriſhed in the eighteenth century, was born at Beziers in the year 1678. He devoted himſelf from a very early period to the ſtudy of literature and ſcience, and obtained ſeats in the Academy of Sciences, and the French Academy. To the former he was choſen perpetual ſecretary, after the death of Fontenelle in 1741. While he continued in that office, he was punctual and diligent in performing its duties, and poſſeſſed the happy art of placing the moſt abſtruſe ſubjects in a clear and intelligible light. In his eulogies he nearly equalled his predeceſſor in the faculty of characterizing the ſubjects of them, and of impartially appreciating their merits. He died in 1771: he was author of a great number of publications on intereſting topics, of which the following may be mentioned, "A Diſſertation on Ice;" "A Diſſertation on the Cauſe of Light of phoſphoric Bodies and Glow-worms;" "An hiſtorical and phyſical Treatiſe on the Aurora Borealis;" "A Letter to Father Parennin, containing ſeveral Queſtions relating to China," which is ſaid to be a very curious work, and full of that philoſophical ſpirit which characterizes the other works of the ſame author: ſome "Memoirs" publiſhed among thoſe of the Academy of Sciences: "Diſſertations," and "Eulogies" on deceaſed academicians, were printed in 1747.

For further information relative to Mairan, ſee Mem. de l'Acad. des Sciences, in which there are many curious articles concerning Harmonics and the philoſophy of Euclid. He accounts for the medicinal powers of muſic in the following manner. "It is from the mechanical and involuntary connection between the organ of hearing, and the conſonances excited in the outward air, joined to the rapid communication of the vibrations of this organ to the whole nervous ſyſtem, that we owe the cure of ſpaſmodic diſorders, and of fevers attended with a delirium and convulſions, of which our Memoirs furniſh many examples."

MAIRE, JOHN LE, a French poet, was born at Hainault in 1473, and died in 1524. He wrote among other pieces an allegorical poem, called the "Tales of Cupids, and of Atropos."

MAIRE, JAMES LE, a Dutch navigator, who ſailed from the Texel in 1615 with two ſhips, and in the following year he diſcovered the ſtraits, which bear his name in South America. After viſiting New Guinea, he ſailed to Batavia, where he was made priſoner, and his veſſel confiſcated, under the pretence of his having infringed on the rights of the Dutch Eaſt India company. He died on his paſſage to Europe in 1617.

MAIRE, LE, a French muſician of the 17th century, is generally allowed the honour of having invented, or at leaſt brought into uſe, in France, the ſyllable *ſi*, to expreſs the 7th of the key of C, inſtead of repeating the *mi* in ſolmiſation, by which ſtudents in ſinging eſcape the perplexing difficulty of the mutations. The title to the invention, ſmall as it ſeems, has been often diſputed; but having taken great pains to trace the firſt uſe of this ſyllable in ſinging, we have never been able to diſcover any muſician to whom it is ſo juſtly due as Le Maire. With reſpect to the utility of this invention, we think it would be much extended if the ſharp 7th of every major key, as well as that of *ut*, were called *ſi*.

MAIRE, LE, *Streight of*, in *Geography*, a narrow paſſage from the Atlantic to the Pacific ocean, between Terra del Fuego on the weſt, and the weſtward of Staten Land on the eaſt, about five leagues long and as many broad; ſo called from Le Maire, who, with his companion Schouten, ſailed from the Texel on the 14th of June 1615, diſcovered this paſſage: and they were the firſt who ever entered the Pacific ocean by the way of Cape Horn. In the account of lord Anſon's voyage it is ſaid, that it is difficult to determine exactly where this ſtreight lies, though the appearance of Terra del Fuego be well known, without knowing alſo the appearance of Staten Land; and that ſome navigators have been deceived by three hills on Staten Land, which have been miſtaken for the Three Brothers in Terra del Fuego, and ſo overſhot the ſtreight. But no ſhip, ſays lieutenant Cook, who paſſed this ſtreight in January 1769, can poſſibly miſs it that coaſts Terra del Fuego within ſight of land; for it will then, of itſelf, be ſufficiently conſpicuous: and Staten Land, which forms the eaſt ſide, will be ſtill more manifeſtly diſtinguiſhed, for there is no land in Terra del Fuego like it. The ſtreight of Le Maire can be miſſed only by ſtanding too far to the eaſtward, without keeping the land of Terra del Fuego

Fuego in ſight: if this is done, it may be miſſed, however accurately the appearance of the coaſt of Staten Land may have been exhibited; and if this is not done, it cannot be miſſed, though the appearance of that coaſt be not known. The entrance of the ſtreight ſhould not be attempted but with a fair wind and moderate weather, and upon the very beginning of the tide of flood, which happens here, at the full and change of the moon, about one or two o'clock: it is alſo beſt to keep as near to the Terra del Fuego ſhore as the winds will admit. By attending to theſe particulars, a ſhip may be got quite through the ſtreight in one tide; or, at leaſt, to the fouthward of Succeſs bay, into which it will be more prudent to put, if the wind ſhould be ſoutherly, than to attempt the weathering of Staten Land with a lee-wind and a current, which may endanger her being driven on that iſland. The bay of Good Succeſs lies about the middle of the ſtreight, on the Terra del Fuego ſide, and is diſcovered immediately upon entering the ſtreight from the northward; and the ſouth head of it may be diſtinguiſhed by a mark on the land, that has the appearance of a broad road leading up from the ſea into the country: at the entrance it is half a league wide, and runs in weſtward about two miles and a half. There is good anchorage in every part of it, in from ten to ſeven fathom, clear ground; and it affords plenty of exceeding good wood and water. The tides flow in the bay, at the full and change of the moon, about four or five o'clock, and riſe about five or ſix feet perpendicular. But the flood was two or three hours longer in the ſtreight than in the bay; and the ebb, or northerly current, was with nearly double the ſtrength of the flood. On the W. ſide of the Cape of Good Succeſs, which forms the S.W. entrance of the ſtreight, lies Valentine's bay, from which the land trends away to the W.S.W. for twenty or thirty leagues: it appears to be high and mountainous, and forms ſeveral bays and inlets. At the diſtance of fourteen leagues from the bay of Good Succeſs, in the direction of S.W. $\frac{1}{2}$ W. and between two and three leagues from the ſhore, lies New Iſland; about two leagues in length from N.E. to S.W., and terminates to the N.E. in a remarkable hillock. At the diſtance of ſeven leagues from New Iſland, in the direction of S.W. lies the iſle Evouts, and a little to the W. of the S. of this iſland lie Barnevelt's two ſmall flat iſlands cloſe to each other; they are partly ſurrounded with rocks, which riſe to different heights above the water, and lie twenty-four leagues from the ſtreight of Le Maire: at the diſtance of three leagues from Barnevelt's iſlands, in the direction of S.W. by S. lies the S.E. point of Hermit's iſlands, which from moſt points of view may be taken for one iſland, or a part of the main. From the S.E. point of Hermit's iſlands to Cape Horn, the courſe is S.W. by S. diſtance three leagues. Cook obſerves, that between ſtreight Le Maire and Cape Horn, they found a current ſetting, generally very ſtrong, to the N.E. when they were in with the ſhore; but they loſt it when they were at the diſtance of fifteen or twenty leagues.

Though the doubling of Cape Horn, ſays Cook, is ſo much dreaded, that in the general opinion it is more eligible to paſs through the ſtreight of Magellan, we were not once brought under our cloſe reefed top-ſails after we left the ſtreight of Le Maire. But ſuppoſing it more eligible to go round the Cape than through the ſtreight of Magellan, it may ſtill be queſtioned, whether it is better to go through the ſtreight of Le Maire, or ſtand to the eaſtward, and go round Staten Land. In the account of lord Anſon's voyage the advice is, that all ſhips bound to the South ſeas, inſtead of paſſing through the ſtreight of Le Maire, ſhould conſtantly paſs to the eaſtward of Staten Land, and ſhould be invariably bent on running to the ſouthward as far as the latitude of 61 or 62 degrees, before they endeavour to ſtand to the weſtward. "But, in my opinion," ſays captain Cook, "different circumſtances may at one time render it eligible to paſs through the ſtreight, and to keep to the eaſtward of Staten Land at another. If the land is fallen in with to the weſtward of the ſtreight, and the wind is favourable for going through, I think it would be very injudicious to loſe time by going round Staten Land, and I am confident, that by attending to the directions I have given, the ſtreight may be paſſed with the utmoſt ſafety and convenience; but if, on the contrary, the land is fallen in with to the eaſtward of the ſtreight, and the wind ſhould prove tempeſtuous or unfavourable, I think it would be beſt to go round Staten Land. But I cannot, in any caſe, concur in recommending the running into the latitude of 61° or 62°, before any endeavour is made to ſtand to the weſtward. We found neither the current nor the ſtreams which the running ſo far to the ſouthward is ſuppoſed neceſſary to avoid; and, indeed, as the winds almoſt conſtantly blow from that quarter, it is ſcarcely poſſible to purſue the advice. The navigator has no choice, but to ſtand to the ſouthward, cloſe upon a wind, and by keeping upon that tack, he will not only make ſouthing, but weſting; and, if the wind varies towards the north of the coaſt, his weſting will be conſiderable. It will, indeed, be highly proper to make ſure of a weſting ſufficient to double all the lands, before an attempt is made to ſtand to the northward, and to this every man's own prudence will, of neceſſity, direct him." Hawkeſworth's Voyages, vol. ii.

Maire, a ſmall iſland in the Mediterranean, near the coaſt of France. N. lat. 43° 14'. E. long. 6° 24'.

MAISBINNI, a town of Abyſſinia; ſix miles W. of Axum.

MAISERRY, a town of Bengal; 10 miles S. of Ghidore.

MAISEY, a town of Hindooſtan, in Bahar; 45 miles N. of Patna. N. lat. 26° 22'. E. long. 85° 18'.

MAISNAH, a town of Bengal; ſeven miles N.N.W. of Goragot.

MAISTRE, Antony de, in *Biography*, a French writer, was born at Paris in 1608; he was brought up to the bar, but quitted the profeſſion, and entered into the ſociety of Port Royal, where he died in 1658. The greater part of his life he ſpent in acts of the ſevereſt mortification, in writing various works, and in the ſtudy of theological ſubjects. His principal pieces are "Pleadings," which have been repeatedly reprinted; a French tranſlation of the treatiſe "On the Prieſthood by St. John Chryſoſtom;" a tranſlation of the works of St. Bernard: he had employed himſelf on a French verſion of the Old and New Teſtament. Moreri.

Maistre, Louis Isaac le, better known by the name of *Sacy*, brother of the preceding, was born at Paris in the year 1613. He was brought up for the church, and was ordained prieſt in 1648. The perſecution of the Janſeniſts, in which the members of Port Royal were involved, obliged him to conceal himſelf in the year 1661, but being diſcovered in the place of his retreat in 1666, he was ſent to the Baſtile. Here he was confined more than two years and a half, during which time he employed himſelf on the tranſlation of the Bible, and finiſhed the whole of the Old Teſtament. After his liberation he completed his verſion of the New Teſtament, which he went over thrice, before he could pronounce it finiſhed. His works are extremely numerous, and the topics very various. He was a perfect maſter of the French language, and wrote it elegantly. Moréri.

MAITEA, in *Geography*. See OSNABURG *Iſland*.

MAITED, a town of Perſia, in the province of Kerman; 16 miles N.E. of Sergian.

MAITLAND, JOHN, in *Biography*, lord Thyelſtane, and chancellor of Scotland, was born in 1545. He accompanied king James VI. to Norway, where his conſort, the princeſs of Denmark, was detained by contrary winds. He died in 1595. He was author of "Epigrammata Latina," publiſhed in the "Deliciæ Poetarum Scotorum." Gen. Biog. Dict.

MAITLAND, WILLIAM, a topographical and antiquarian writer, was born at Brechin, in Scotland, in 1693. His buſineſs as a hair merchant led him to travel, and he viſited Sweden, Denmark, and Germany, and finally ſettled in London. Here he began to apply himſelf to the ſtudy of antiquities; and in 1739 publiſhed the firſt fruit of his labours, which was his "Hiſtory of London." The work, which was an improvement upon that of Stowe, became popular, and has ſince been ſeveral times reprinted, with conſiderable additions: it has likewiſe furniſhed materials for many ſmaller and more modern publications. Soon after the publication of this work, the author is ſuppoſed to have retired to his native country, for the purpoſe of purſuing enquiries into its hiſtorical antiquities, and, in 1753, he publiſhed "A Hiſtory of Edinburgh." Succeſs in this inſtance led him to extend his reſearches to a much wider compaſs, and he employed himſelf in writing "The Hiſtory and Antiquities of Scotland, from the earlieſt Account of Time to the Death of James; continued by another Hand to the Acceſſion of James VI. to the Crown of England." This work was publiſhed in two volumes folio in 1757; the ſame year the author died at Montroſe. Mr. Maitland deſerves great applauſe for his induſtry, but he was not reckoned competent for ſuch a taſk, either with regard to learning or critical acumen.

MAITLAND, HENRY, a ſurgeon, is worthy of notice, principally as being the firſt perſon who performed the operation of *inoculating* the ſmall-pox in England. Mr. Maitland reſided at Conſtantinople, in the early part of the 18th century, with the Hon. Wortley Montague, then ambaſſador at the Ottoman court, where the only ſon of that gentleman was inoculated, at the age of ſix years, in 1717: and, on their return to England, Mr. Maitland inoculated the infant daughter of the ſame gentleman, in April, 1721. He publiſhed a detail of theſe caſes, and of thoſe of ſome condemned criminals in Newgate, in February, 1722, in a pamphlet, entitled "An Account of Inoculating the Small-Pox;" and ſubſequently, a ſecond pamphlet in "Vindication" of the former, in reply to the attack of Dr. Wagſtaffe. See INOCULATION.

MAITRE à CHANTER, *Fr.*, a ſinging-maſter. Rouſſeau has ſo well pointed out the functions of a ſinging-maſter in teaching the elements of the vocal art, that we ſhall tranſlate the chief part of his article on the ſubject. He includes the maſter's taſk in two principal objects. The firſt regards the cultivating and forming the voice, by making it capable of all that belongs to ſinging, with reſpect to compaſs, truth of intonation, clearneſs and ſweetneſs of tone, execution, ſwelling and diminiſhing the notes, hitting diſtances with preciſion, and acquiring a free and open ſhake.

The ſecond object regards the ſtudy of the muſical characters; that is, acquiring a facility in reading muſic at ſight, as accurately and readily as a printed book, in the ſtudent's own language.

A third part of a maſter's buſineſs is to enforce the duty of pronouncing and articulating the words with accuracy and energy; becauſe defects in pronunciation are much more ſenſible in ſinging than ſpeaking; as the ſinger is expected to tune and ſoften the harſh ſyllables, and render the ſoft ſtill more ſweet.

Millieo uſed to ſay, that a voice ſhould be ſo cultivated and exerciſed in *ſolfeggi*, as to reſemble a ball of wax, ſo long tempered in the hand that it can receive any impreſſion.

Rouſſeau ſays nothing of *expreſſion*, but that muſt come from the heart as well as the voice. It is perhaps only to be learned by imitation, and taught by example. There are many clear and powerful voices which give the hearer no pleaſure, however accurately they may execute the notes; while a feeble voice has often the undefinable power of affecting us by a natural pathos and intereſting expreſſion that touches and delights us the inſtant it is heard. See CANTARE, SOLFEGGIA, and EXPRESSION.

MAITRE-JEAN, ANTHONY, in *Biography*, an oculiſt and ſurgeon, was educated at Paris, and practiſed at Mery on the Seine, with great reputation, at the beginning of the eighteenth century. He was particularly diſtinguiſhed for his ſucceſs in the treatment of diſeaſes of the eyes, both the healthy and morbid ſtructure of which he had inveſtigated with great induſtry and accuracy, as his work, entitled "Traité des Maladies de l'Œil, et des Remèdes propres pour leur Gueriſon," 1707, ſufficiently proves. This treatiſe, which was ſeveral times reprinted and tranſlated, was long a ſtandard, and is ſtill entitled to eſteem. It contained the firſt ſatisfactory proofs that the ſeat of cataract was excluſively in the cryſtalline lens, and treated copiouſly on all the varieties of the operation of couching. He likewiſe publiſhed, "Obſervations ſur la Formation du Poulet," Paris 1722, with figures, drawn by himſelf; a work which contains many original experiments and remarks, and which, according to Haller, is not ſufficiently eſteemed. Maitre-Jean was a correſponding member of the Academy of Sciences at Paris, and ſome of his papers were printed in the Memoirs of that learned body. Eloy Dict. Hiſt. de la Méd. Gen. Biog.

MAITS, in *Geography*, a lake of Pruſſia, in Natangen; 20 miles S. of Raſtenburg.

MAITTAIRE, MICHAEL, in *Biography*, an eminent bibliographer and philologiſt, was born about the year 1668. The place of his birth has not been aſcertained, but it has been inferred from the name that he was deſcended from parents, refugees from France. He was educated at Chriſt-church, Oxford, and took his degree of M.A. in 1696: previouſly to this, he had been nominated ſecond maſter of Weſtminſter-ſchool, a poſt which he occupied till 1699. He was intended for the church, and wrote ſome controverſial pieces, but it does not appear that he took orders. He was patronized by the firſt earl of Oxford, and enjoyed the favour of the ſecond earl, and was afterwards appointed tutor to lord Cheſterfield's natural ſon, Mr. Stanhope. He was deeply ſkilled in claſſical learning, and was author of many works, which ſtill bear a good reputation. His firſt piece was entitled "Græcæ Linguæ Dialecti;" which was ſucceeded by an "Engliſh Grammar." Typographical antiquities were his ſtudy and delight, and he gave the public, in connection with theſe ſubjects, the following works: "Stephanorum Hiſtoria, vitas ipſorum ac libros complectens;" "Hiſtoria Typographorum aliquot Pariſienſium;" "Annales Typographici ab artis Inventione." In the firſt volume, the hiſtory of printing was brought down to the year 1500: the ſecond continued it till 1536;

1536; and the third to the year 1664. This was publifhed in 1725. A volume, publifhed at Amfterdam in 1773, ufually reckoned the fourth, is, in fact, a revifion of the other three. This is a work of great labour, and highly regarded by bibliographers. A fupplement to it was publifhed in 1789, at Vienna, fince which an enlarged edition of the whole has been printed at Nuremberg. Mr. Maittaire edited a number of claffical authors, both feparately and in a collected form: of thefe may be mentioned "Opera et Fragmenta veterum Poetarum," in two volumes, folio: "A Greek Teftament;" "Mifcellanea Græcorum aliquot Scriptorum-Carmina;" "Anacreontis Carmina;" and an edition of Livy in feven volumes 12mo. He addreffed to the emprefs of Ruffia, a "Carmen Epinicium," of his own compofition; and publifhed a volume of Latin poems under the title of "Senilia."

MAJUMA, or New Gaza, in *Geography*, a fea-port town of Paleftine, near *Gaza;* which fee.

MAIXENT, St., a town of France, in the department of the Two Sevres, and chief place of a canton, in the diftrict of Niort; 6 miles N.E. of Niort. The place contains 5000, and the two cantons 19,767 inhabitants, on a territory of 230 kiliometres, in 14 communes.—Alfo, a town of France, in the department of the Sarthe, feated on the Seure; badly built, furrounded with walls, and containing an ancient caftle with two fauxbourgs, and about 5000 inhabitants; 6 miles S. of La Ferte Bernard.

MAIZ, in *Agriculture*, a provincial term applied to a large light fort of hay bafket, in fome diftricts.

MAIZE, or Indian Corn, in *Botany*. See Zea.

Maize, in *Agriculture*, a fpecies of grain much ufed for food in America, under the name of Indian corn. It is very productive; the fize of its ears, where it is cultivated on good warm foils, being, on a medium, nearly a fpan long, having commonly eight or more rows of grain, each of which ufually contains about thirty feeds of various colours, as red, white, yellow, blue, olive, greenifh, blackifh, fpeckled, ftriped, &c. fometimes in the fame field and fame ear; but the white and yellow are the moft common: nor does this diverfity of colours ever reach beyond the outfide of the grain, the flower of which is always white, with a little tinge of yellow. The feeds, which are as big as large peas, are round at the outer furface, very fmooth, and fet extremely clofe in ftraight lines. The ear is clothed and armed with feveral ftrong thick hufks, which defend it not only from unfeafonable rains, and the cold of the night (for it does not ripen fully in fome places till towards the latter end of September), but alfo from birds. In the northern diftricts, the ftalk of this plant, which contains a remarkable fweet pith, and is jointed like the fugar-cane, does not grow near fo high as in the fouthern parts. It has long leaves, almoft like the flag at every joint, and at the top a bunch of flowers of various colours. Its culture upon any extenfive fcale has not hitherto been attempted in this climate.

Soil, Preparation, and Method of fowing or planting.—This kind of crop may be grown on moft forts of foils. On a light, poor, fandy foil, in Miller's trials, the method of preparation for it was to have the land ploughed up deep before winter, and laid up in high ridges till the fpring, when it was broken fine with the harrow. It was ploughed again in April, laid level, harrowed fmooth, and then fowed in drills, four feet afunder, into which the feeds were dropped at the diftance of about eight or nine inches from each other. When the plants were about three inches high, they were thinned with a hand-hoe, by cutting up fome of them where they grew too clofe, and the intervals between the rows ploughed fhallow, to deftroy the young weeds: but when the ftems were advanced, the ground in the intervals was ploughed deep, and the earth laid up to the plants on both fides; and when the weeds began to grow again, a third ploughing was given, to deftroy them. This kept the ground pretty clean from weeds till the corn was ripe, as the feafon did not prove wet; otherwife a fourth ploughing would have been neceffary.

In Ireland, in the experiments of fir Richard Bulkeley, the grains were fet a foot afunder, in rows about a yard diftant from each other. In the former of thefe cafes, there were from each ftalk from three to fix fpikes of grain, and in the latter from three to fix ftems, and upon each ftem three fpikes, or ears of corn, with two hundred and forty grains on each fpike, which was an amazing increafe.

In M. Duhamel's attempts to raife this fort of grain, he found it to thrive better in a light and fandy foil, than in ftiff and clayey land. It did not anfwer without dung; and the ground intended for it received two good ploughings in March. A third ploughing, given towards the end of April, made the furrows for the feed; and what clods remained after this were either broken by hand or the roller.

And a fine clear day was chofen in May for fowing the feed, which was done by making at the bottom of the furrows, with a ftick or other inftrument, fmall holes, into each of which two grains of maize were dropped. The furrows were a foot and a half afunder, and the holes at the fame diftance, difpofed in fuch a manner, as to form a kind of quincunx. When the corn-plants appeared, the weakeft of the two were plucked up, where both feeds had fprung; and where neither of them had grown, two new grains were planted. Towards the middle of June the ground was hand-hoed round each plant; and as they *ftud* at the bottom of the furrow, the mould which crumbles down from time to time, laid frefh earth to their roots, and helped to fupport them. About the end of July, a flight hoeing was again given them, which was the laft; and the earth laid towards the roots of the plants.

It is fuggefted, that the panicles of the male flowers, which grow at the top of each plant, and are well known not to contain any grain, fhould be cut off about the middle of Auguft, but care muft be taken that the grain be impregnated before this is done, which may be known by the turgid appearance of the outward covering of the ears: and they fhould not be cut off from all the plants at the fame time, as fome of the ears are not impregnated till a fortnight after others. Thefe panicles are excellent food for cattle. When they are cut, or fhortly after, all the leaves fhould be ftripped off the ftalks, together with all the blighted and fmutty ears: for it is faid, that the good ears would not grow fo large, nor the grains be fo well nourifhed, if they fhould be left upon the ftalks. All thefe leaves and ears are given as fodder to oxen.

The proper time for reaping maize is towards the end of September. The ears are then gathered by hand, and put into bafkets, in which they are carried, and laid in heaps, from fpace to fpace, in the field, after which they are loaded in carts, carried home, and fpread upon an even floor prepared for that purpofe. They are then taken out of their fheath, or hood, and dried in the fun, before they are laid up in the granary, or elfe the grain is taken out at that time. Maize, which has been well dried in the fun, will keep feveral years, and not be the lefs fit for fowing. The granary fhould be very dry, and the corn laid up in it fhould be turned at leaft every three months, to prevent its growing mufty, or being attacked by infects. There are two ways of taking out the grain; the firft, which is the moft expeditious, is by threfhing it with a flail; but in this method a deal of the corn is broken or bruiſed. The 2d, and more common, is by rubbing the ears hard againſt the edge of a flat piece of iron; this eaſily ſeparates the grains from the ſpike, or cob, without hurting them, and this remainder of the ear is very good food for oxen. As ſoon as the ears are gathered, the ſtalks remaining in the ground are plucked up, and laid by for winter fodder for oxen or other cattle. The field is afterwards ploughed up as ſoon as poſſible, it being the general opinion of farmers, that the roots of the maize would otherwiſe continue to ſuck up the rich particles of the earth: whether this be true or not, their notion is, that if this ploughing ſhould be deferred, the next year's crop would certainly ſuffer by it.

When maize is planted only for fodder, particularly for cows and oxen, it is ſowed very thick, and harrowed in, or covered with a rake, in a good ſoil which has been ploughed twice, and well dunged; but it is obſerved, that in theſe thick ſowings, all the female flowers are barren, and produce no grain: and it likewiſe is ſo great an impoveriſher of land, that though the ground be dunged every time it is planted, wheat never does ſo well where this corn has grown, as in the neighbouring fields where it never was grown.

In M. Amien's trials it was found of importance to ſow maize rather in the beginning than at the latter end of May, becauſe, if it be ſown early, the plants will have acquired ſufficient ſtrength, before the great heats, to ſhoot out then with vigour, and the ears be not liable to that barrenneſs to which they are ſubject when ſown late; beſides, the ſtalks will be ſtronger, and their ears larger and fuller of grain; the ears of maize alſo are greatly hurt by cutting the panicles too late, which ought to be done before the hoods are open. By leaving a plant with its male flowers at every twenty feet diſtance, all the female ears may be impregnated.

In order to aſcertain whether it is beſt to ſow maize thick or thin, he planted three different ſpots of ground with this corn in April; the ſeed uſed for the firſt, where the grains were placed about a foot and a half aſunder, according to the common practice of the country, weighed one ounce and one penny-weight; the ſecond, in which the grains were only a foot aſunder, was ſowed with two ounces and two penny-weights of ſeed; and the third, in which they were but ſix inches apart, was ſowed with four ounces and a half. The firſt of theſe ſpots produced eighteen pounds and four ounces of grain; the ſecond fifteen pounds ſeven ounces; and the third eleven pounds two ounces. A manifeſt proof, M. Amien thinks, that ſome ſorts of grain do not thrive unleſs they are ſown very thin, and that for want of this precaution, a great deal of corn is often loſt, and the crops conſiderably diminiſhed.

It is found that this plant, when cut green, affords a good cattle food: the grain is likewiſe highly uſeful for feeding poultry and hogs, and, when ground into flour, for various purpoſes.

But in America, according to a late writer, the common method to prepare land for Indian corn, is in the fall (Autumn) to plough it, or what is termed *fluſhing* it. The foil is raiſed in a rough manner by ploughing broad furrows; it being ſo thin, that it is not turned over, but ſtands very much on the edge: the ploughs are of a bad conſtruction. In the latter end of April, or beginning of May, the plan is to *liſt* it out, that is, croſſing the field five or ſix feet aſunder, ſetting two furrows back to back, then the like the other way, which forms a ſort of hill where theſe furrows croſs each other. The practice is then to go with a large hoe, ſuch as that its weight will break the clods in the ſame manner as malls (beetles) for that uſe, and make the mould very fine, ſomething in the manner that gardeners do for cucumbers in the field-gardens in this country. In theſe hills are put four or five corns, and this is generally done in the firſt of May.

Reckoning four corns to one hill, four thouſand only will be required to plant an acre containing a thouſand hills. When the corn is come up, the cuſtom is to go with their hoes, and draw a little mould to the plants, deſtroy any weeds that may appear, and plant freſh corn, if any be wanting, which often happens; that done, to plough from thoſe hills both ways, then to go with the hoes, and work the hills again, and to draw the plants of an inferior kind out, leaving two of the beſt on each hill, or if the land be good, three and ſometimes four, and to tranſplant thoſe drawn out where any are wanting. However, when more than two plants are left on one hill, there will be little corn, but much tops and blades. Then to plough all the land towards the plants one way; after this it is neceſſary to what they term *ſucker* them, that is, to take off any young ſprouts that have tillered, otherwiſe the corn will not grow in the ear to its proper length or ſize, but grow ſhort, what they call *cobbings;* this done, juſt before it goes into ſilk, they plough the land to the corn the contrary way, which is five times in all. The expence would be about ſeven pounds *per* acre, if the work were done by hired labourers, and horſes for ploughing.

Expences per Acre.

	£.	s.	d.
To ploughing, or what is termed *fluſhing*	1	2	6
Liſting, and preparing the hills for planting and ſowing ſeed - - -	1	2	6
Moulding the corn, where the firſt miſſed	0	15	0
Ploughing from the corn - -	0	18	0
Hoeing and tranſplanting, where any plants may be wanted - - -	0	15	0
Ploughing to the corn - -	0	18	0
Suckering the corn - - -	0	3	9
Ploughing the contrary way to the corn	0	18	0
Topping and blading - - -	0	3	9
Leading home - - -	0	1	0
Pulling the corn - - -	0	1	0
Carrying home - - -	0	0	6
Seed - - - - -	0	2	0
Huſking fifteen buſhels - -	0	1	6
Rubbing it off the ear, (fifteen buſhels)	0	15	0
	7	17	6

After the laſt time of ploughing, which is during the latter end of Auguſt, ſome of them ſow wheat under furrow, for which the Indian corn crop is a preparation, but which is harrowed in by others in September; the ploughing is done in a ſkimmering manner, very thin.

It is found that "the raiſing of Indian corn is an abſolute preparation for wheat, rye, or winter barley, and perhaps better for the land in that hot country, than if nothing was grown, coſting little more than the ſeed wheat. It is a general practice to cut the tops, and pull the blades, before they ſow the wheat; the topping and blading is done by cutting the tops off with a knife, juſt above the uppermoſt ear, as there are or ought to be two ears on each ſtalk, which are thrown out about four feet above the ground; the writer has had from five to ſeven ears put out ſilk, but they never came to perfection."

The writer, however, in his own practice, put the corn into the ground in drills, at different diſtances from three to

ſix

fix feet, harrowing the feed in, and found on actual trials, that a better crop of Indian corn may be raifed by planting at fix feet apart, and eighteen inches in the drills, than by any other mode which he has attempted, where the land is rich. Upon very poor land he does not, however, doubt but that the hill method may be fuperior, as by hoeing and ploughing there may be rather more of the beft earth added to the roots of the corn. This fort of drilling was found the beft and cleaneft method, as well as probably the cheapeft.

It is further ftated, that "good Indian corn will be from twelve to fourteen feet high, and that the white corn is much higher than the yellow; but the yellow is by far the fweeteft, although the tops and blades are not fo abundant. There are feveral kinds or varieties, both of yellow and white corn; the yellow is earlier than the white by one month." And, that, "the tops are fet up in bunches or fhocks; the blades are pulled off, tied up in fmall bundles, about one pound each, and hung on one of the corn ftalks by the tie or band, and in two or three days it is ready to carry." It is added, that "the ufual method of preferving them for the winter is to make what is termed a fodder-houfe, by fetting up long grained pofts, and laying a rail upon the top, then placing other rails upon the ground, leaning againft what may be termed the ridge-tree, they then lay the tops on like thatch, the blades are ftored within the houfe; the hufks are put into the houfe after the corn is gathered and hufked, and given in the winter to the cattle. The white corn generally hangs on till frofty weather, as it takes a great deal of curing or hardening, having a very thick hufk and a large cob. One leaf hangs over another, and the ear hangs downwards, and would not take harm all the winter, were not the ear to drop off the ftalk. It is generally gathered in frofty weather, and fometimes when fnow is on the ground. One reafon for this may be, that it does lefs injury to the wheat, as they are obliged to cart upon the land where the wheat grows. The corn is taken from the cob by hand, as it cannot be threfhed as grain is. The farmers have generally a hufking feaft, when all the neighbours come and help to hufk."

It may be noticed that this fort of crop was formerly introduced in rotation with other forts of grains, fo as to greatly injure the ground, as well as be lefs productive; and the practice ftill prevails in many places; but in the more improved methods of cultivation, and where the better forts of hufbandry prevail, it is now the cuftom to grow this kind of grain in courfes with crops of the green ameliorating fort, fuch as thefe below, and in that manner.

Courfes of Crops.

I. Old American Maize Courfe.	II. Better Maize Courfe.	III. Improved Maize Courfe.
1. Maize,	1. Maize,	1. Maize,
2. Wheat or rye,	2. Wheat, or fpring barley,	2. Beans,
3. Lay, or mean pafture;	3. Clover,	3. Barley,
or,	4. Rye or winter barley,	4. Clover,
1. Maize,	5. Clover,	5. Wheat,
2. Naked fallow,	6. Clover.	6. Clover.
3. Wheat,		
4. Lay, or mean pafture.		

This is not a beneficial crop, and from calculation it cannot; yet it muft be a ufeful one, as it is the whole fupport of the American population. They begin to eat it as foon as it is formed in what is termed roafting ears; they boil them, and eat the corn in the fame manner as we do green peas, with drawn butter, and no bacon, ham, beef, mutton, or any other kind of meat. The blades and tops feed the horfes, cattle, and fheep; the corn feeds both man and beaft, and is very excellent food for fowls, hogs, &c. The people eat it in *hominy*, mufh and bread, or cakes; the *hominy* is made in like manner to our creed wheat buttered, by knocking the hufk off in a wooden mortar; the mufh is made of the flour as our hafty pudding, and eaten with milk or treacle. The better fort of people make a very nice cake, with eggs and milk, about the thicknefs of pyflects, or what are called crumpets in London; the lower clafs of people mix the flour with water, make a fort of pafte, and lay it before the fire on a board or fhingle to bake, and generally eat it hot, as it is but very indifferent food when cold; it is called *Johnny* cake.

MAIZIERES, in *Geography*, a town of France, in the department of the Upper Marne, and chief place of a canton, in the diftrict of Joinville; four miles N.W. of Joinville.

MAKADAMA, in *Mythology*, a name of the Hindoo god of love, *Kama;* which fee.

MAKALLA, in *Geography*, a fea-port town of Arabia, in the province of Hadramaut; 60 miles S.S.W. of Hadramaut.

MAKANNA, a kingdom of Africa, fituated between the rivers Senegal and Gambia; 300 miles from the Atlantic ocean.

MAKARA, a fabulous marine monfter, frequently mentioned and alluded to by Indian authors. It is borne in the banner of *Kama*, the Hindoo god of love, as noticed under that article; one of whofe names is hence Makara-ketu. It is alfo the fign Capricorn in the Indian zodiacs, and fome writers deem it the horned fhark. A combination of the goat and fifh in that fign is not unfrequently feen on the zodiac of feveral nations, both eaftern and weftern, of which notice is taken under the article CAPRICORN.

MAKAREV, in *Geography*, a town of Ruffia, in the government of Niznei-Novgorod, on the Volga; 24 miles E.N.E. of Niznei-Novgorod. N. lat. 56° 25'. E. long. 44° 44'. Alfo, a town of Ruffia, in the government of Koftrom, on the Unza; 80 miles E. of Koftroma. N. lat. 58° 50'. E. long. 44° 14'.

MAKAYA, a town of Africa, in the kingdom of Kayor, about 21 miles from the Atlantic ocean. N. lat. 15° 20'. W. long. 16° 24'.

MAKE, in *Law*, fignifies to perform and execute.

Thus, to make his law, is to perform that law to which a man had formerly bound himfelf; *v. gr.* to clear himfelf of action commenced againft him by his own oath, and the oath of his neighbours, otherwife called to wage law. See WAGER *of Law*.

So, to make fervices or cuftoms, is nothing elfe but to perform what belongs to them.

MAKE-

MAKE-*hawk*, in *Falconry.* See HAWK.

MAKE, *To*, in *Sea Language*, is varioufly applied : *e. g. to make a board*. See BOARD.

To make the land, is to difcover it from a diftant fituation, in confequence of approaching it after a fea voyage: to make fail is to increafe the quantity of fail already extended, either by letting out the reefs, and by hoifting an additional number of fmall fails, or by either of thefe operations feparately: to make ftern way, is to retreat or move with the ftern foremoft : to make water cafually fignifies to leak ; but a fhip is faid to make foul water, when running in fhallow water, her keel difturbs the mud or ooze, lying at its bottom.

MAKEN KUR-ASSAY, in *Geography*, one of the Kurile iflands, about 20 verfts in length, and ten in breadth. It is fcattered with rocks, efpecially about the fhores, and many meadow grounds and moift places. It has no ftanding wood, but a few fhrubs ; its red foxes are few; fea-beavers and feals lie about its fhores. It has neither lake nor ftream, though it abounds with fprings ; it is altogether uninhabited.

MAKEFIELD, UPPER *and Lower*, townfhips of America, in Berks' county, Pennfylvania, the former containing 1101, and the latter 963 inhabitants.

MAKENABAD, a town of Perfia, in Segeftan ; 90 miles S.E. of Zareng.

MAKER, a village of England, in the county of Devon, on the Cornifh fide of the Tamar, near Plymouth found : the church tower of which is a fea mark. N. lat. 50 20′. W. long. 4° 11′.

MAKER-DUR, a town of Hindooftan, in the circar of Kitchwara ; 22 miles N. of Budawar.

MAKERRA, a river of Algiers, that rifes about 26 miles E. from Tremecen, and after a courfe of about 30 miles changes its name to Sig.

MAKESIN, a town of Afiatic Turkey, in the province of Diarbekir, on the Khabur ; 105 miles S.W. of Moful.

MAKIAN. See MACKIAN.

MAKINBOY, a name given by the people of Ireland to a kind of fpurge, or tithymale, common there : this is a very violent purge, as all the other fpurges are ; but the Irifh have an opinion that it will produce this effect only by being carried in the pocket. This opinion, which had been univerfally believed for many ages, was proved to be falfe by Dr. Mullen, who carried a large quantity of it about him many days together, on purpofe to give a fair trial ; but it had not any the leaft effect on him.

MAKING-UP, a term ufed by diftillers to exprefs the bringing fpirits to a certain ftandard of ftrength by the addition of water. See LOWERING.

It is ufed principally in the diftilling fpirits, after their firft drawing, either by way of rectifying them, or of giving them the virtues of aromatic ingredients, in order to make the compound waters ; fuch as cinnamon, anifeed, and the like. See DISTILLATION.

In the making of thefe compounds, fome ufe an alcohol, or totally inflammable fpirit, which is much the beft method ; others ufe ordinary proof fpirit of malt, or molaffes. If the latter be ufed, it is beft not to put any water with it into the ftill ; but if the former, fo much water is to be added as will reduce it to the proof ftrength, which is juft an equal quantity. When this is done, there fhould be drawn off three-fifths of the whole by diftillation ; and the far better way would be to keep this liquor in this very ftate, which is juft the ftrength of the trois-cinques brandy of the French : but as people require thefe waters to be kept for drinking, in fuch a ftate as not to exceed at the utmoft the ftrength of proof fpirit, generally to fall much fhort of it, it is neceffary to reduce this three-fifths to the whole, or more than the whole quantity of the proof fpirit put into the ftill. The apothecaries, to this end, ufually let the ftill continue to work without changing the receiver, till an equal quantity is produced to the fpirit put in, or one-fourth more ; it being the ufual ftandard in thefe waters to have five quarts made from a gallon of the fpirit. By the method of doing this, by letting the ftill run, the faints are taken into the water, and give it a vapid and difagreeable tafte. Inftead of this, the diftiller, when he has drawn off his three-fifths of the quantity of proof, makes up the whole of the deftined quantity, by adding the two other fifths, or more than that, if required, of common water, in which it is alfo cuftomary to diffolve fome fine fugar, and this gives a fulnefs in the mouth to the water, and makes it mellow, or lofe the fiery tafte of the ftill much fooner. If it be only made up to the ftrength of proof, it will mellow much fooner than if reduced one-fifth below that ftandard, as the oil is much more perfectly diffolved in fpirit of a ftandard proof ftrength, than in fuch as is weaker. The water employed in the making up, fhould be either foft and clear river-water, or elfe fpring-water rendered foft by diftillation, otherwife it is apt to turn the water thick, and precipitate a fediment, efpecially if the water be drawn lower than proof, or if the fpirit, originally employed, partake of an alkaline nature from the falts ufed in its rectification, as is ufually the cafe in the malt fpirits, the grofs oil of which requires to be feparated by mixing falt of tartar or pot-afh with it in the ftill in the rectification

When it is neceffary to make up waters lower than proof, they are generally cloudy ; but this may be remedied, and they may be fined down in a day or two with a fmall quantity of alum, or with whites of eggs, or the jelly of ifinglafs beat up to a froth, and mixed in the fame manner as is ufually done in the refining of wines.

The fugar, added to thefe cordial waters, has not only the advantages of mellowing and filling the mouth, but it unites the oil to the fpirit in a manner that it could never be united in without it. Shaw's Effay on Diftillery.

MAKKEDAH, in *Ancient Geography*, a royal city of the tribe of Judah, in Paleftine, near which the five kings of the Amorites were put to death by Jofhua. It was once a very ftrong city, and placed by Eufebius about eight miles from Eleutheropolis.

MAKO, PAUL, in *Biography*, canon of the cathedral of Waizen, a learned Hungarian, defcended from a noble family, was born at Jafz-apatin in the year 1724 ; he entered the order of the Jefuits, and made fuch progrefs in his ftudies, that he was foon appointed teacher of logic and metaphyfics at Tymau, and afterwards profeffor in the univerfity of Vienna. He filled the fame department afterwards in the Therefianum, where he procured, by his amiable difpofition, the love and efteem of all the young nobility who frequented that feminary from almoft every part of Europe ; and when the Hungarian high fchool of Tymau was afterwards transferred to Ofen, the emprefs, Mary Therefa, appointed him a member of the academic fenate. He exerted himfelf with great zeal and ability to introduce a tafte for fcientific purfuits into Hungary ; and during his moments of leifure, he purfued, with unabating ardour, the belles lettres. He died in 1793. The principal works which he left behind him are, "Defcriptio Provinciæ Moxitarum in regno Peruano, quam e Scriptis pofthumis Franc-Xav. Eder e Soc. Jef. Annis XV. facri apud eofdem curionis digeffit, expolivit et adnotatiunculis illuftravit, P. Mako ;" "Differtatio Phyf. de natura et remediis Fulminum ;" "Elementa Mathefeos puræ;" "Elementa Geometriæ Puræ." Gen. Biog.

MAKONDA, in *Geography*, a town of Africa, in Loango, on the fea-coaft; 40 miles N.W. of Loango.

MAKOONDA, a town of Hindooftan, in the country of Allahabad; 60 miles S. of Allahabad. N. lat. 24° 33'. E. long. 84 37'.

MAKOVITZE, a town of Hungary; 16 miles S.E. of Palotza.

MAKOUSKI, John, in *Biography*, generally known by the name of *Maccovius*, a celebrated Polifh Proteftant divine, and profeffor of divinity at Franeker, was born at Lobzenic in the year 1588. He went through his courfe of philofophy at Dantzic, under the celebrated Keckerman, and rofe to eminence among his fellow ftudents. He was admitted doctor of divinity at Franeker in the year 1614, and was in the following year elected to the profefforfhip of divinity in the univerfity. In the exercife of the duties attached to his office, he was accufed of herefy, and the charge being made, it was examined by the fynod of Dort, who gave it as their opinion, that he was unjuftly accufed. He died in 1644, leaving behind him feveral works relating to the controverfy againft the Arminians and Socinians. Moreri.

MAKOVSKOI, in *Geography*, a town of Ruffia, in the government of Tobolfk, on the Ket; 48 miles W. of Emfeifk.

MAKOW, a town of Perfian Armenia; 81 miles S. of Erivan.—Alfo, a town of the duchy of Warfaw; 40 miles N.N.E. of Warfaw.

MAKRAN. See Mecran.

Makran, a town of Arabia, in the province of Hedsjas, the refidence of a fcheich.

MAKSCHOUS, a town of Arabia, in the highlands of Hedsjas, the refidence of an independent fovereign fcheich, whofe domain contains feveral towns and villages. This fcheich is of the tribe of Harb, and he is fo powerful that on occafion he can bring 2000 men into the field. During the months favourable for pafturage, the moft diftinguifhed perfons of this tribe live in tents; during the refidue of the year, they inhabit the towns and villages. The lower clafs live commonly through the whole year in huts thatched with grafs. Their principality is fituated upon the mountains between Mecca and Medina. The chief of the tribe of Harb is the perfon who principally harafles the caravans, and lays them under contribution. Unlefs the Syrians and Egyptians pay the tribute he demands, for permiffion to pafs through his territories, he mufters up an army of his own fubjects and his neighbours, all of whom are very willing to pillage a caravan.

MAKSENOVKA, an oftrog of Ruffia, in the government of Irkutfk, on the coaft of the Frozen fea. N. lat. 72. E. long. 134° 24'.

MAKSIMA, St., a fmall ifland of Ruffia, in the Frozen fea. N. lat. 71° 20'. E. long. 133° 34'.

MAKSUDEGHI, a town of Perfia, in Farfiftan; eight miles S. of Komfha.

MAKSZYN, a town of Bulgaria; 50 miles W.S.W. of Ifmael.

MAKTIN, a town of Beffarabia; 34 miles S.S.W. of Akerman.

MAKU, or St. Thaddeus, a town of Perfian Armenia, on the Akfiai, a river which runs into the Aras; 60 miles S. of Erivan.

MAL des Ardens, or *Morbus ardentium*, in *Medicine*, terms which have been applied by fome medical writers to two or three different epidemic difeafes, in an acceptation nearly fynonimous with the *ignis Sti. Antonii*, and *ignis facer* of others. See Ignis *facer*, and Ergot.

MALA, or Demala, in *Geography*, a town of European Turkey, in the Morea; 45 miles S.E. of Argos.

Mala, a river of Peru, which runs into the Pacific ocean, S. lat. 12° 40'.

Mala *Aurea*, in *Botany*, a name by which fome authors have called the *poma amoris*, or fruit of the lycoperficon.

MALAAC, in *Geography*, a town of Meckley, 12 miles S.S.E. of Munnypour.

MALABAR, a name given to the weftern coaft of Hindooftan, from cape Comorin to about 100 miles S. of Goa.

The name of Malabar is faid to be derived from the Malabar word "Malayalam," denoting "mountainous;" the terminations *ar*, *tar*, and *bar*, fignifying, in that language, a *people* or *nation*; confequently "Maleiwar" or "Maleibar" would denote as much as "mountaineers," or "inhabitants of the mountains." The fyllable *lai*, when uttered with rapidity, takes the found of *la*, and the name of Malabar was applied to the people, from the hilly country, who defcended from the mountains, and fettled upon the coaft.

That tract of country which is properly called the Malabar, lies nearly in the direction of N.W. and S.E. from cape Comorin to Canara, between the 18th and 14th degrees of north latitude; to the eaft, it is divided from the coaft of Coromandel, by a high range of mountains, called the "Ghauts," and to the fouth-weft it is wafhed by the Arabian fea. The principal kingdoms which it comprehends are thofe of Travancore, Cochim, Cranganore, and Calicut; of which the firft has become the principal and the moft powerful. The Malabar, or rather the forts of Coylang, Cali Coylang, Cranganore, and Cananore, eftablifhed by the Portuguefe on that coaft, were conquered by the Dutch in the years 1662 and 1663, and they long retained the poffeffion of all, except Cananore. The extent of the Dutch company's poffeffions from Coylang to Chittua, Cananore not being under their dominion, comprifed, from S.E. to N.W. a diftance of 32 leagues; but if we except *Paponetty*, (which fee,) and fome fmall diftricts interfperfed along the coaft, the company poffeffed no other actual property in the foil, than in that upon which their fortifications were conftructed. The land is every where low, interfected by many rivers, which defcend from the interior mountains; it abounds in plantations of trees, and more efpecially of the cocoa-nut tree, and affords a very pleafant profpect. The rivers render it extremely fertile, particularly in rice; the fea furnifhes a copious fupply of fifh, and provifions are cheap. The feafons are diftinguifhed into the dry and rainy, called the bad and good monfoon; the former being reckoned from October to April, and the latter comprehending the other months. This divifion is occafioned by the mountains of the Ghauts; for upon the coaft of Coromandel, the reverfe takes place with refpect to the monfoons.

The firft and principal article of trade produced upon the coaft of Malabar is pepper, which is very abundant, and reckoned the beft in Afia. The Areca nut is the fecond production of the country; and this is conveyed by land to all parts of the peninfula, and likewife by fea, to the coaft of Coromandel, and to Bengal. A third production is the wild cinnamon (Caffia lignea), of which it is faid that a quantity of one million of pounds is yearly exported to the gulf of Perfia, and to the Red fea; and a fmall proportion is fent to Europe, where it is principally ufed to adulterate the genuine, or Ceylon, cinnamon. Coarfe cotton cloths are alfo made in the fouthern parts, in the Travancore country, which, without forming a confiderable object of trade, were moftly

moftly difpofed of to the Englifh at Anfjengo. Capok forms alfo an article of trade, and is exported to Bengal, to the coaft of Coromandel, and to China.

The native inhabitants of the country are inclined to be lean; they are ufually of the fame fize and ftature as the Gentoos at Surat and in Bengal; but they are much blacker, nearly as black as the African negroes, though with better formed countenances. Their religion is that of the Hindoos, but many of them have been converted by miffionaries to the Roman Catholic perfuafion, and they have many Roman Catholic churches. Here are alfo many Chriftians, of thofe denominated Chriftians of St. Thomas. Among the Malabars, the "Nairs" are the nobles and warriors of the land, who are diftinguifhed by the fcymetar which they always wear, and who poffefs many privileges above the common people. Their princes poffefs almoft an abfolute authority over their fubjects. Befides the original Malabars, many other people have been allured to fettle here, by the profits of trade; fuch as Moors, Arabians, Perfians, and a colony of Jews, who, as they pretend, are the pofterity of the ten tribes carried away into captivity by Shalmanefer. Thefe dwell in a feparate town, in which are three fynagogues. The towns, or villages, which they inhabit, and where they are employed in trade, has received the appellation of "Makwan-Sieri."

Cranganore was fold by the Dutch to the king of Travancore, taken from him by Hyder Ali, and re-taken by the Englifh in 1790. Cochim, Quilon, Quila-Quilon, and the other fettlements of the Dutch, on the coaft of Malabar, have fhared the fate of the greater part of their Indian poffeffions, and are actually in the hands of the Englifh.

MALABAR, *Cape*, or *Sandy Point*, a narrow ftrip of land, projecting from the S.E. part of cape Cod, in the Maffachufetts, eight miles S. by W. N. lat. 41° 33'. W. long. 70° 3'.

MALABAR *Nut*, in *Botany*, a fpecies of the *jufticia*; which fee.

MALABATHRUM, among the *Ancients*, an excellent fweet-fcented ointment.

MALABATHRUM, *Indian leaf*, in *Botany*. See TAMALAPATRA.

MALABRIGO, in *Geography*, a harbour on the coaft of Peru, in the South fea.

MALACATLAN, a town of Mexico, in the province of Mechoacan; 16 miles S.E. of Colima.

MALACCA, or MALAYA, a peninfula of Afia, at the extremity of the kingdom of Siam, furrounded by the fea, except at its junction with this kingdom. The northern limits are not ftrictly defined; but the peninfula is reckoned to be about 80°, or 560 Britifh miles in length, and in medial breadth about 150 miles. It derives its name from the Malays, who are moftly Mahometans, and in a confiderable degree civilized; but the inland parts feem to be poffeffed by a more rude native race, of which our knowledge is very imperfect. In the laft century Mandelflo, or rather Olearius, who publifhed his voyage, defcribes Malacca as divided into two kingdoms, that of "Patani" in the north, and that of "Johor" in the fouth. The former was inhabited by Malays and Siamefe; who were by profeffion Mahometans, and tributary to Siam. The town is built of reeds and wood, but the mofque of brick; and the commerce was conducted by the Chinefe and Portuguefe fettlers, while the native Malays were chiefly employed in fifhing and agriculture. From this traveller we learn, that in Malacca there are continued rains with a N.E. wind during the months of November, December, and January. Agriculture was conducted with oxen and buffaloes, the chief product being rice. Game and fruits were abundant, and the forefts fwarmed with monkies, tigers, wild boars, and wild elephants. Befides the tiger and elegant, Malacca produces the civet-cat, and Sonnerat fays that wild men are found here, meaning perhaps orang-outangs. Some fingular birds are alfo found; and it likewife produces a delicious fruit called the Mangoften. The Portuguefe were accuftomed to purchafe annually from Patani about 1500 cattle for their fettlement at Malacca. The kingdom of Johor comprehended the fouthern extremity of the Cherfonefe, and its chief towns were Linga, Bintam, Carimon, and Betufabea, the laft of which was the capital, fituated in a marfhy fituation, on the river Johor, about fix leagues from the fea, and confifting of houfes elevated about eight feet from the ground. The whole of this country belonged to the king, who affigned lands to thofe who demanded them; but the indolence of the Malays left it to the wild luxuriance of nature. According to the account of Valentyn, the peninfula of Malacca is bounded on the north by the river Riadang, which runs by Linga to the eaft, and by a fmall range of hills that feparate it from the kingdom of Siam; and it contained five provinces, which derive their names from their capitals. On the eaftern coaft are thofe of Patani and Pahang, followed by the moft fouthern kingdom of Djohor or Johor; and on the weftern coaft are thofe of Keidah, or Quedah, and Perah, followed by another province called the Malay coaft, and of which the capital is Malacca. The inland part of the peninfula feems to remain full of extenfive and original forefts, without towns or villages; but the country, though not fufficiently explored, is now known to produce pepper and other fpices, with fome precious gums and woods. The chief mineral is tin, in which Quedah and Perah, as Hamilton denominates them, are rich; and a high mountain N.E. of Malacca fupplies rivers that afford fmall quantities of gold duft. In the river Pahaung, flowing near the town of Malacca, lumps of gold about five or fix ounces in weight have been found at the depth of from three to ten fathoms. Of the government of Malacca we may form an idea from the account which Mr. Marfden has given of that of the Malays in Sumatra. See MENANGEABOW.

From an account of the ancient hiftory of this country, cited by Valentyn in his "Defcription of the Dutch Settlements in the Eaft Indies," 1726, from a Malay MS. written in the Arabian character, we are led to believe, that the Malays were firft fettled on the eaftern coaft of Sumatra, in the kingdom of Palambang, oppofite to the ifle of Banca, at the river Malajee, which encircles the mountain Mahameirac, and afterwards joins the river Tatang. Some have fuppofed that the river derives its name from the Malays; but Valentyn is of opinion that they derived their name from the river, and communicated it to their prefent peninfula, which formerly belonged to the king of Siam, and was inhabited by fifhermen. This MS. being recent, we can only infer from it that the Malays came from the weft. The traditions founded on this and other fimilar MSS. report, that the Malays, during their refidence in Sumatra, chofe a king, who reigned 48 years, and pretended to be a defcendant of Alexander the Great. This happened about the year 1160 of the Chriftian era. During this reign, it is faid, the Malays proceeded to the oppofite coaft and fettled on the N.E. corner, whence they gradually fpread, and the country affumed the name "Tanah Malajee," or Malay land, extending from 2 to 11 N. lat. After a refidence of fome years, the Malays built their firft town "Singapoera," which gave its name to the fouthern ftrait.

ſtrait. The laſt king of Singapoera was compelled by a hoſtile ſovereign of a diſtrict in the iſle of Java to retire northward, where, in the year 1253, he built a new capital, called Malacca, as it is ſaid, from the name of a tree, the Mirabolan, under which he had taken ſhelter, while he was hunting. Having eſtabliſhed ſalutary laws, he died in the year 1274. As this king had adopted the appellations "Shah" and "Sultan," it furniſhes a preſumption, that Mahometaniſm was now introduced. The ſecond in ſucceſſion after this prince, who is eſteemed the firſt Mahometan ſovereign, reigned 57 years. He extended more widely the name of Malays, and having acquired by marriage the kingdom of Aracan, he died in 1333. In proceſs of time, the commercial town of Malacca was regarded, with Madjapit and Poſi, as the third celebrated city in theſe regions. Sultan Mantſoer Shah, who aſcended the throne in 1374, and in the courſe of his long reign of 73 years, annexed by marriage the kingdom of Andrigiri on the E. ſide of Sumatra, to Malacca, became ſo powerful that he was ſtyled emperor. In conſequence of an alliance with the emperor of China, whoſe daughter he married, he ſubdued the kingdom of Pahang. Malacca was now eſteemed the chief city in theſe parts of the eaſtern world. Mantſoer died in 1447. During an inglorious reign of his ſon and ſucceſſor, the 11th king of the Malays, the 6th of Malacca, and the 5th who profeſſed the Mahometan religion, Malacca became ſubject to Siam; but at his death, in 1477, he was ſucceeded by a prince, under whoſe government, in the year 1509, the Malays threw off the yoke of Siam. It was in this year that the Portugueſe diſcovered Malacca, to which they were led by the vain idea of finding the golden Cherſoneſe of the ancients.

With this view Emanuel, king of Portugal, ſent out a fleet of 16 ſhips under the command of Sequeira. Among the officers of this fleet was Magalhaens or Magellan, who afterwards became famous as the firſt circumnavigator of the globe. Many attempts were made to aſſaſſinate Sequeira, and finding it impoſſible to make a commercial arrangement advantageous to his country, he returned to Portugal. At this time Albuquerque (ſee his article) was the Portugueſe viceroy in the Eaſt Indies. On the 1ſt of Auguſt, 1511, he arrived before Malacca with a powerful fleet, while the king of Pahang was in the town on occaſion of celebrating his nuptials with the daughter of ſultan Mahmud Shah, the ſovereign of the peninſula. Malacca was taken by ſtorm; and the king fled to Johor, where he founded a new town and kingdom. The Portugueſe, having gained complete poſſeſſion of Malacca, formed an alliance with Siam. The king of Johor died in 1513, and was ſucceeded by his ſon ſultan Ahmud Shah, who afterwards made a treaty with the Portugueſe. Among the Portugueſe governors of Malacca was Peter Maſcarenhas in 1526, from whom was, probably, derived the name anciently given to the iſle of Bourbon. During the reign of a ſovereign, called Alawoddin, who took poſſeſſion of the throne in 1591, the Dutch arrived, and formed an alliance with this prince againſt the Portugueſe. In 1606 the Dutch, in conjunction with the king of Johor, attacked Malacca; and they made various attempts in ſucceeding years to gain poſſeſſion of the country. But they were obliged to content themſelves with a factory in Johor. At length Anthony Van Diemen, the famous governor-general of the Dutch ſettlements in the Eaſt Indies, finding a favourable opportunity for the execution of his purpoſe, diſpatched in June 1640, a fleet of 12 ſhips and ſix ſloops to blockade Malacca; and theſe were joined by about 20 ſmall veſſels of Johor. The Dutch ſoon erected a battery, and the ſiege was accompanied with famine and peſtilence. In January, 1541, the famine was ſo ſevere, that the inhabitants were obliged to expel their women and children. The Dutch alſo ſuffered much from heat and fatigue; and at length impatience and deſperation produced a general aſſault, which was executed on the 14th of January; and the governor capitulated. Valentyn reports, that during the ſiege more than 7000 died in the town and a greater number found means to eſcape. The Dutch loſt about 1500, chiefly by the plague. Thus the Portugueſe, after a poſſeſſion of nearly 130 years, loſt this valuable ſettlement, then eſteemed, after Goa, the richeſt in the Eaſt Indies. Malacca, which is repreſented as a ſtrong place, was taken poſſeſſion of by the Engliſh in Auguſt 1795. The Malay empire is now added to the dominions of Great Britain in the Eaſt by the capture of Java, in conſequence of which Britain is become the miſtreſs of the whole of the Malayan Archipelago.

The Malays, whoſe origin is not ſatisfactorily aſcertained, are in general a well made people, ſomewhat below the middle ſtature. Their limbs are ſmall, but well ſhaped, and they are particularly ſlender at the wriſts and ankles. Their complexion is tawny, their eyes large, their noſes ſeem to be flattened more by art than nature; and their hair is very long, black, and ſhining. They are reckoned the moſt ingenious, ſagacious, and poliſhed people in the Eaſt Indies. As the Malays reſemble the Chineſe and Tartars in their features, it has been ſuggeſted as probable that they are deſcended from thoſe nations. Their progreſs from Malacca, acroſs the narrow ſtrait of that name, to Sumatra, from thence to Java, and from Java to all Polyneſia, was ſo eaſy, even in the moſt frail veſſels, that there is no difficulty in accounting for their being found, as they really are, in poſſeſſion of the ſea-coaſts of almoſt every iſland. Mr. Marſden, in the laſt edition of his valuable work, ſeems to have retracted the opinion which he once held of Malacca being the original country of the Malays, and to think that they paſſed thither from Sumatra. Not only their phyſical appearance, but their manners and cuſtoms, as well as language, have undergone a conſiderable change by the overwhelming influence of the Arabs, who from the 9th to the 14th century, appear to have enjoyed the excluſive commerce and dominion of the oriental iſlands, the greater part of which has received the religion of Mahomet. Theſe people in former times poſſeſſed great powers, and made a very conſiderable figure on the theatre of Aſia; and their country was well cultivated and populous. The ſea was covered with their ſhips, and their commerce was very extenſive. At different times they ſent out various colonies, which in ſucceſſion peopled a great part of Sumatra, Java, Borneo, Celebes, and Macaſſar, the Moluccas, the Philippines, and thoſe innumerable iſlands of the Archipelago, which bound Aſia on the E. and which occupy an extent of 700 leagues in longitude from E. to W. and about 600 in latitude from N. to S. Every where the people ſeem to be the ſame. They ſpeak almoſt the ſame language, and they have the ſame laws and the ſame manners. To this purpoſe Kæmpfer ſays in his "Hiſtory of Japan," that the Malayans had in former times the greateſt trade in the Eaſt Indies, and frequented with their merchant ſhips not only all the coaſts of Aſia, but ventured even over to the coaſts of Africa, particularly to the great iſland of Madagaſcar. That the Malayans have not only frequented Madagaſcar, but that they have been the progenitors of ſome of the preſent race of inhabitants, is confirmed by the teſtimony of M. de Pages, who viſited that iſland ſo late as 1774. The title which the king of the Malayans aſſumed to himſelf, ſays Kæmpfer, of "Lord of the Winds and Seas to to the Eaft and Weft," is an evident proof of their extenfive migration; but much more the Malay language, which fpread almoft all over the Eaft, much after the fame manner as formerly the Latin, and of late the French, did all over Europe.

M. le Poivre, cited by Mr. Pennant in his "Outlines of the Globe," fays, that travellers, who make obfervations on the Malays, are aftonifhed to find in the centre of Afia, under the fcorching climate of the line, the laws, the manners, the cuftoms, and the prejudices of the ancient inhabitants of the north of Europe. The Malays are governed by feudal laws, "that capricious fyftem, conceived for the defence of the liberty of a few againft the tyranny of one, whilft the multitude is fubject to flavery and oppreffion." Thus we have here a chief, who has the title of king or fultan, iffuing his commands to his great vaffals, who obey when they think proper; thefe have inferior vaffals whofe conduct is fimilar to that of their fuperiors. The "Oramcai," or noble, forming a fmall part of the nation, live independent, and fell their fervices to thofe who are difpofed or able to give them the beft price; whilft the body of the nation is compofed of flaves, and lives in perpetual fervitude. With thefe laws, fays M. le Poivre, the Malays are reftlefs, fond of navigation, war, plunder, emigrations, colonies, defperate enterprifes, adventures, and gallantry. They talk inceffantly of their honour and bravery, whilft they are univerfally confidered by thofe with whom they have intercourfe as the moft treacherous and ferocious people on the face of the globe; and yet, which appears extremely fingular, they fpeak the fofteft language of Afia. The ferocity of the Macaffars is the reigning characteriftic of all the Malay nations, and as an evidence of their faithleffnefs and treachery, it is alleged, that their treaties of peace and friendfhip never fubfift beyond that felf-intereft by which they were induced to make them; and they are almoft always armed, and either at war among themfelves, or employed in pillaging their neighbours. Their ferocity, mifnamed courage by the Malays, is fo well known to the Europeans who have fettlements in the Indies, that they have univerfally agreed in prohibiting the captains of their fhips, who may put into the Malay iflands, from taking on board any feamen of that nation, except in the greateft diftrefs, and then on no account to exceed two or three. It is not uncommon for a few of thefe horrid favages fuddenly to embark, attack a veffel by furprife, poignard in hand, maffacre the people, and make themfelves mafters of her. Malay barks, with 25 or 30 men, have been known to board European fhips of 30 or 40 guns, in order to take poffeffion of them, and murder with their poignards great part of the crew. Thofe Malays who are not flaves always go armed; and they would think themfelves difgraced if they went abroad without their poignards, or criffes.

The attire of the males confift of pantaloons with a wide robe of blue, red, or green; the neck is bare, but the head is covered with a turban. The female drefs, like that generally ufed in the Eaft Indies, is a long narrow petticoat, reaching from the breaft to the feet, whilft the other parts are naked, and the hair is commoly tied. The women are reckoned more intelligent than moft others in the eaft, and their converfation is of courfe fenfible and agreeable.

The other inhabitants of Malacca are Portuguefe, Moors, and Chinefe, and fome fettlers from Bengal and Guzerat. The chief articles of commerce are azel wood and camphor from the kingdom of Pahang; tin, gold, pepper, pedra de porco, and ivory. The manufactures are various articles of drefs, worn here and in Hindooftan, cottons, chintz, &c. and fome articles of copper. When Malacca came into the poffeffion of the Dutch, the Dutch Eaft India company appointed the governor, under whofe controul were feveral factories, fome in the peninfula, and others on the coaft of Sumatra. The factories are thofe of Peirah, or Perah, on the Malay coaft, for the tin trade; of Keidah, or Quedah, on the fame coaft, for carrying on commerce with the petty king of Xeedah, for tin, gold, and ivory; of Oedjan-Salang, for tin and ivory; of Andrigiri, on the coaft of Sumatra, for pepper and gold. The Dutch alfo traded with Ligor and Tanaferim, in the dominions of Siam, for tin; and with Bangkoelo, for gold and pedra de porco before the Englifh eftablifhed themfelves there. The ifland Dending was alfo confidered as a dependence of Malacca.

The language of the Malays, which is original in the peninfula, has been called the Italian of the eaft, on account of the melody of its frequent vowels and liquids, and the infrequency of any harfh combination of mute confonants. Their character is the Arabic. Mr. Marfden could never difcover that the Malays have any original written characters peculiar to themfelves, before they acquired thofe now in ufe; though it is poffible that fuch may have been loft. The adoption of the Mahometan religion has occafioned an influx of Arabic words into their language: the Portuguefe have alfo furnifhed them with many new terms. They write on paper with ink of their own compofition, and pens made of the twigs of a tree. The pureft Malay is fuppofed to be fpoken in the peninfula, and it has no inflexions of nouns or verbs; and, confequently, no cafes, declenfions, moods, or conjugations; all which inflexions are performed by the ufe of certain words expreffive of a determinate meaning. The Malay language, or that which may be confidered as its radix or foundation, has branched out into various dialects, that have been extended to all the iflands of the eaftern fea; from Madagafcar to the remoteft of Capt. Cook's difcoveries, comprehending a wider extent than the Roman or any other tongue has yet boafted.

Of the connection and fimilarity of thefe various languages, Mr. Marfden has exhibited indifputable examples in a paper addreffed to the Society of Antiquaries, and publifhed in the "Archæologia," (vol. vi.) In different places it has been more or lefs mixed and corrupted, but between the moft diffimilar branches, an evident famenefs of many radical words is apparent, and in fome, very diftant from each other in point of fituation, *e.g.* the Philippines and Madagafcar, the deviation of the words is fcarcely greater than is obfervable in the dialects of neighbouring provinces of the fame kingdom. See Marfden's Hiftory of Sumatra, and Dictionary.

In the third volume of the "Afiatic Refearches" (p. 11 and 12.) fir William Jones has pointed out, in a clear and decided manner, the connection between the Malayan and Sanfcrit languages; and Mr. Marfden (Id. vol. iv. p. 217.) obferves, that the Malayan is indebted to the Sanfcrit for a confiderable number of its terms. This ingenious writer conceives, that the intercourfe by which this communication was effected muft have taken place in times anterior, probably by many centuries, to the converfion of thefe people to the Mahometan religion; and before a great number of Arabic words, borrowed from the Koran and its commentaries, were introduced into the language. Our author, however, does not imagine, that the affinity between thefe languages is radical, or that the names for the common objects of fenfe are borrowed from the Sanfcrit. The Malayan, as we have already ftated, is a branch or dialect of the widely extended language prevailing throughout the iflands of the Archipelago, called the "Malay-archipelago" and comprehending the Sunda, Philippine, and Molucca iflands, in the maritime parts of which the Malayan is ufed as as a "lingua franca," and alſo thoſe of the South ſea, including, between the fartheſt limits of Madagaſcar on one ſide and Eaſter iſland on the other, the ſpace of full 200 degrees of longitude. This conſideration alone is ſufficient to give it claim to the higheſt degree of antiquity, even to originality, as far as that term can be applied. The various dialects of this ſpeech, though they have a wonderful agreement in many eſſential properties, have experienced thoſe changes, which ſeparation, time, and accident produce; and in reſpect to the purpoſes of intercourſe, may be claſſed into ſeveral languages, differing conſiderably from each other. The marks of cultivation which diſtinguiſh the Malayan from his ruder neighbours, are to be attributed, in the opinion of Mr. Marſden, to the effects of an early connection that muſt have ſubſiſted between the inhabitants of this eaſtern peninſula, and thoſe of the continent of India. The Malayan, as he conceives, has not received any portion of its improvement, except from the genuine Hinduvee of the northern provinces, prior to its debaſement by the mixture of Arabic nouns, and the abuſe of verbal auxiliaries. If the communication ſhould be ſuppoſed to have its origin in commerce, our author inclines to conſider the people of Guzerat, notwithſtanding their diſtance, as the inſtructors of the Malays; as it is well known that the Hindu language has been preſerved with greater purity in that, than in any other maritime province of India. The probability is ſtrong, that the inhabitants of the Malay peninſula were in poſſeſſion of an alphabet, of the ſame model with that of the Hindus, and were even ſkilled in compoſition, before the Mahometans introduced their learning and character among them. Frequent alluſions to the moſt celebrated works of the Hindu mythological poets, eſpecially the Mahabharat and the Ramayan, occur in the Malay writings; and theſe alluſions imply that tranſlations of the works were formerly in the hands of the Malays.

The Malayan language poſſeſſes, as we have already obſerved, a ſmoothneſs and ſweetneſs of ſound, rendering it well adapted to poetry, to which the Malayans are paſſionately addicted. They amuſe all their leiſure hours, including the greater portion of their lives, with the repetition of ſongs, which are, for the moſt part, proverbs illuſtrating, or figures of ſpeech applied to, the occurrences of life. Some, which they rehearſe in a kind of recitative at their bimbangs, or feaſts, are hiſtorical love tales, like our old Engliſh ballads, but often extempore. There are numerous works written in the Malay language, beſides hiſtorical ballads, or ſongs on national traditions. See the writers already cited, and Pinkerton's Geog. vol. ii. For an account of the Malays of Ceylon, ſee Percival's Ceylon.

Malacca, the chief town of the country above deſcribed, ſituated on the Malay coaſt, about eight leagues from the iſland of Sumatra. N. lat. 2° 12′ 6″. E. long. 102° 8′ 45″. It is ſituated partly upon a hill, and partly on level ground, which is low, wet, and unhealthy. Its circumference is about 1800 paces, and towards the ſea there is a ſtrong wall, about 600 paces long, and alſo another by the ſide of the river. Its fortifications have long ſince been conſiderably decayed. The adjacent country is ſo flat, that the ſea ſhore is dry to a conſiderable diſtance at low water, and the ſhore is difficult of acceſs, on account of the ſoftneſs and muddineſs of the bottom. The juriſdiction of the town is about 30 miles in length, and from eight to ten in breadth. Two ſmall iſles, called "Ilha des Naos" and "Ilha des Padras," at a ſmall diſtance ſupply clay for bricks; and formerly the Portugueſe veſſels uſed to anchor between them. Two rivers are contiguous to the town; one on the N. called Cryſorant, and another on the S. which is more conſiderable, called Pahaung. The ſhape of the town, which preſents many broad ſtraight ſtreets, is that of a creſcent.

Before the conqueſt of the Portugueſe, Malacca was a fiſhing town; it afterwards contained 11,000 inhabitants; but in the time of Valentyn, the number had decreaſed to between two and three hundred Dutch, Portugueſe, and ſome Malays in huts at the extremities of the town, who poſſeſſed ſome plantations in the vicinity. Around the town are woods infeſted with wild beaſts, eſpecially tigers; and elephants are very numerous. This city was founded by the Mahometans in the 13th century, and held by the Portugueſe till 1641, when it was ſeized by the Dutch. It gained great importance from its advantageous poſition for Indian and Chineſe commerce. See the preceding article.

Malacca, *Strait of*, the narrow ſea between the iſland of Sumatra, and the peninſula of Malacca, extending from the equinoctial line to about 5° N lat. This ſtrait preſents favourable opportunities for commerce, which has been maintained for a long time, and in a conſiderable degree, with Bengal, Coromandel, Surat, Perſia, Ceylon, Java, Sumatra, Siam, Tonquin, China, and other places. This was a convenient ſtation for the veſſels paſſing through the ſtrait from Japan to Hindooſtan, and ſome choſe this route to Batavia. In this ſtrait proviſions are ſcarce, except fiſh and a few fruits.

Malacca *Stones*, a name given by many authors to the *pedr del porco*, or hog-bezoar.

MALACHE, formed of μαλασσω, *I ſoften*, a term uſed by authors in a different ſenſe; ſometimes expreſſing ſuch medicines as gently looſen the belly, and ſometimes ſuch ointments as relax and mollify.

MALACHI, *the Prophecy of*, is one of the canonical books of the Old Teſtament, written by Malachi, who, according to a tradition among the ancients, was of the tribe of Zebulon, and born at Sapha, after the return of the captivity from Babylon, and who died young. He was probably contemporary with Nehemiah, and muſt have lived after the time of Haggai and Zechariah, becauſe his prophecy ſuppoſes the temple to be rebuilt, and the worſhip of God eſtabliſhed in it. Uſher places him in the year 416, and Blair in 436 B.C. Some have doubted whether Malachi was a proper name, or a general appellation, ſignifying the angel or meſſenger of the Lord. Malachi, מלאכי, denotes "my angel;" but the LXX have rendered the word, his angel, and not my angel, as the original expreſſes it; and ſeveral of the fathers have quoted Malachi under the name of "the Angel of the Lord" It is the opinion of the ancient Hebrews, of the Chaldee Paraphraſt, and of St. Jerom, that Malachi was Ezra. The chief corruptions which he charges upon the Jews are the ſame with thoſe for which they were reproved by Nehemiah; he forbids them to expect any farther ſucceſſion of prophets, exhorts them to obſerve the law of Moſes, and predicts the coming of Elias, or John the Baptiſt, as the forerunner of the Meſſiah.

Biſhop Lowth, in his "Prelectiones," ſays, that this book is written in a kind of middle ſtyle, which ſeems to indicate that the Hebrew poetry, from the time of the Babyloniſh captivity, was in a declining ſtate, and being paſt its prime and vigour, was then faſt verging towards the debility of age.

MALACHITES. See Copper, *Ores of.*

MALACHODENDRUM, in *Botany*, ſo called by Mitchell and Cavanilles, from μαλακος, *ſoft*, and δενδρον, *a tree*, on account of its ſoft or downy leaves. Hence alſo the origin of μαλαχη, *a mallow*. This ſuppoſed genus differs in nothing from Stuartia, to which we refer the reader, except in the ſeparation of its five ſtyles, which in the other

ſpecies.

ſpecies are combined into one.—M. *corchoroides*, Mart. Mill. Dict. v 3, is erroneouſly referred hither after Forſkall, and is *Sida ſpinoſa*, Vahl. Symb. v. 2. 78.

MALACHRA, like *Malachodendrum* and other genera, owes its derivation to μαλακος, *ſoft*, or *delicate*, doubtleſs from the ſoftneſs of its pubeſcence. Schreb. 464. Willd. Sp. Pl. v. 3. 768. Mart. Mill. Dict. v. 3. Juſſ. 272. Cavan. Diſſ. faſc. 2. 97. Lamarck Illuſtr. t. 580.—Claſs and order, *Monadelphia Polyandria*. Nat. Ord. *Columniferæ*, Linn. *Malvaceæ*, Juſſ.

Gen. Ch. *Cal. Common Perianth* large, bearing about five flowers, divided into three or five, heart-ſhaped, acute, permanent leaves: *proper* of one leaf, bell-ſhaped, ſmall, five-cleft, permanent, ſet round with briſtle-ſhaped ſcales. *Cor* Petals five, obovate, entire, adhering below to the tube of the ſtamens. *Stam.* Filaments numerous, united below into a tube, gaping and looſe above, over the whole ſurface of the cylinder; anthers kidney-ſhaped. *Piſt.* Germen orbicular; ſtyle cylindrical, ten-cleft; ſtigmas globoſe. *Peric.* Capſules five, aggregate, roundiſh, compreſſed on one ſide, gibbous on the other. *Seeds* ſolitary, roundiſh, angular.

Eſſ. Ch. Common calyx of three leaves and many flowers, large. Capſules five, ſingle-ſeeded.

Obſ. Cavanilles has remarked, that, in *Malachra*, the diviſions of the ſtyle and the ſtigmas are twice as many as the capſules.

1. M. *capitata*. Linn. Syſt. Veg. ed. 14 624. Willd. n. 1. Swartz. Obſ. 262.—Stem rough. Flowers ſeven in a head. Leaves ſomewhat heart-ſhaped, ſlightly lobed.—A native of marſhy places in the Caribbee iſlands.—*Stem* thick, erect, two feet high. *Leaves* ſtalked, furniſhed with awl-ſhaped ſtipulas. *Flowers* aggregate, ſeſſile, yellow.

2. M. *faſciata*. Willd. n 2. Jacq. Ic. Rar. v. 3. t. 548.—Stem villoſe Flowers about five in a head. Leaves roundiſh, ſomewhat lobed.—A native of the Caraccas.—*Stem* ſix feet in height, remarkably rough, with rigid hairs. *Leaves* on long, hairy footſtalks, the lower ones five-lobed at the margin, the upper ones three-lobed. *Flowers* axillary, ſmall, bluſh-coloured on the outſide; whitiſh, with purple ſtreaks, within.

3. M. *alceæfolia*. Willd. n. 3. Jacq. Ic. Rar. v. 3. t 549.—Flowers about ten in a head. Leaves cordate, deeply five-lobed.—A native of Martinique.—*Stem* ſix feet high, upright, branched, hairy. *Leaves* alternate, heart-ſhaped at the baſe, veiny, widely ſpreading, obtuſely ſerrated or notched. *Flowers* axillary, rather ſmall, of a deep yellow colour.

4. M. *radiata*. Linn. Syſt. Veg. ed. 14. 624. Cavan. Diſſ. t. 33. f. 3. (Sida radiata; Linn. Sp. Pl. 965.)—Flowers many in a head. Leaves palmate.—Found at St. Domingo.—*Stem* ſix feet in height, tender, round, whitiſh-green, hairy. *Leaves* crenate, hairy, bright green. *Flowers* ſmall, purpliſh.

5. M. *bracteata*. Willd. n. 5. Cavan. Diſſ. t. 34. f. 2.—Flowers many in a head, bracteated. Leaves palmate.—Native of America.—*Stem*, like the whole plant, very hairy. *Leaves* crenate, with ſeven deep, acuminated lobes. *Flowers* about fourteen in each head, whitiſh, ſtreaked with red at the bottom.

6 M. *plumoſa*. Willd. n. 6. (Sida plumoſa; Cavan. Diſſ. t. 12 f. 4.)- Flowers many in a head. Leaves undivided, elliptical, toothed.—A native of the Brazils. *Leaves* truncated. *Involucrum* of many leaves, the outer ones elliptical and toothed, the inner linear and fringed.

MALACIA, μαλακια, nearly ſynonimous with *pica*, and *citta*, ſignifies a depraved appetite, which induces the patient to deſire to eat things which are indigeſtible, and not capable of affording nutriment; or that ſort of depravation of appetite, which was formerly deemed a ſort of privilege attached to the ſtate of pregnancy in women, which induced them to *long for* ſome particular food, with extraordinary earneſtneſs, and eat of it to exceſs. While the *danger* of refuſing indulgence to theſe longings was held as an axiom, they appear to have occurred perpetually; but they are now generally treated with ridicule, and therefore are ſeldom heard of. See Pica.

MALACODERMATA, formed of μαλακος, *ſoft*, and δερμα, *ſkin*, in *Natural Hiſtory*, a term uſed to expreſs ſuch animals as have only ſoft ſkins for their covering; in oppoſition to the oſtracodermata, which have hard ſhelly matters for their covering, ſuch as crabs, lobſters, &c.

MALACOIDES, in *Botany*. See Malope.

MALACOLITE, in *Mineralogy*. See Sahlite.

MALACOPTERIGII, in *Ichthyography*, the name of a large order of fiſhes, which have not prickly fins.

The term is derived from the Greek μαλακος, *ſoft*, and πτερυγιον, *a fin*. The fiſh of this order, are thoſe which have bony fins, with all their extremities not pointed or ſharp, but ſoft and harmleſs. Of this order are the carp, &c.

MALACOSTEON, (from μαλακος, *ſoft*, and οστεον, a *bone*,) in *Surgery*, a morbid ſoftneſs of the bones. See Mollities *Oſſium*.

MALACOSTOMOUS, in *Ichthyography*, the name of a large genus of fiſhes, called in Engliſh the leather-mouthed kind. Theſe fiſhes are wholly deſtitute of teeth in their jaws, but have them placed in their throats, near the orifice of the ſtomach.

The word is derived from the Greek μαλακος, *ſoft*, and στομα, *a mouth*. All the fiſh of this genus have their ſwimming, or air-bladder, divided into two parts; and of this genus are the carp, tench, bream, chub, and the like.

MALACOSTRACA, in *Natural Hiſtory*, a term uſed by ſome, as Ariſtotle, to diſtinguiſh what we call cruſtaceous animals of the ſea, &c. from thoſe which he calls oſtracodermata, or teſtaceous, as we expreſs it. See table of teſtaceous and cruſtaceous animals. See Crustaceous.

MALACOTTA, in *Geography*, a town of Africa, in the country of Warada; the inhabitants manufacture ſoap from the oil of ground nuts: 42 miles E. of Satadoo. N. lat. 12° 30'. W. long. 9° 15'.

MALADUGNO, a town of Naples, in the province of Otranto; 9 miles N.W. of Otranto.

MALAGA, a ſmall, but very ancient city of Spain, in the province of Granada. It was built by the Phœnicians ſeveral centuries B.C.; and it was called "Malacha," or "Malaca," on account of the great quantities of ſalt fiſh ſold here. In proceſs of time it paſſed ſucceſſively under the dominion of the Carthaginians, Romans, Goths, and Moors. Strabo ſays, that a great quantity of ſalt was manufactured in its environs, which was diſpoſed of on the oppoſite coaſt of Africa. That it was a place of importance under the Romans, we may infer from the wrecks of monuments that have been diſcovered in its vicinity. Some of theſe remains, which have been found on the eminences where the light-houſe is placed, and where the caſtle called by the Moors Gibral faro ſtands, have been thought to have belonged to a magnificent Pharos, or perhaps to a temple built on this ſpot by the Romans. It was not till the year 1487, that Ferdinand and Iſabella recovered Malaga, after an obſtinate reſiſtance, from the dominion of the Moors. Malaga is ſituated on the coaſt of the Mediterranean, at the bottom of a deep bay, on on a foil of flate and limeftone. To the fouth it has the fea: to the weft it opens into a fertile plain, watered by two rivers; and to the eaft and north, it is protected by lofty mountains, the tops of which are fometimes covered with fnow, and the fides with olive, almond, orange and lemon trees, and vineyard grounds. The town cannot be called handfome, though the houfes are high: the ftreets are narrow, ill paved, and dirty; and it has not one good fquare. It has, however. a marble fountain, very finely executed, which was a prefent from the republic of Genoa to Charles I. The town has three fauxbourgs. It is the fee of a bifhop, fuffragan to the archbifhop of Seville, and the bifhopric is worth 150,000 ducats, or 16,439*l.* 9*s.* 10*d.* but one-third of this revenue is difpofed of by the king. The whole chapter confifts of the bifhop, with eight dignitaries, twelve canons, twelve minor canons, and the fame number of prebendaries. The dean receives 600*l.* a-year; but the other dignitaries only 450*l.* The town has four parifh churches, two chapels of eafe, twelve monafteries, ten nunneries, four beaterios, fix hofpitals, and feveral chapels and oratories. Of the friars, the Francifcans take the lead, and are held in greateft veneration by the common people; and among thefe, the Capuchins are the moft ufeful members of fociety, devoting themfelves to the fervice of the poor. Malaga has a civil and military governor, a king's lieutenant, a major, aid-major, and a fixed regiment of infantry of three battalions, bearing its name and attached to the place; an alcade major for the adminiftration of juftice, a municipality compofed of a certain number of regidors, a poft-captain, a minifter and an auditor of the Marine, and a board of public economy. This town has alfo a college for the inftruction of youth, and another college, under the title of St. Elmo, for the inftruction of mariners. The population of Malaga under the Moors, was reckoned at 80,000 inhabitants; and in 1747 it was reduced to 32,000; it is now eftimated at 50,000, according to the ftatement of La Borde; but Mr. Townfend, in his "Travels," mentions the number at 41,592, of whom the greateft proportion confifts of females.

Of the buildings, public or private, the only one, particularly worthy of notice, is the cathedral, begun in the year 1528, and, fays Mr. Townfend, not yet completed. It is 360 feet by 180, and 135 in height. The choir in this edifice is admirable on account of its carved work, which reprefents, in very bold relief, the twelve apoftles, and the moft diftinguifhed faints. The cuftom-houfe was erected on a magnificent plan in 1792. The confulate at Malaga have founded a very beneficial eftablifhment, which is a "Mont de pieté," defigned for lending money without intereft to farmers, in order to prevent their felling their commodities, particularly wines, at a great lofs. The funds of this inftitution arife from vacant benefices.

The port of this town is large and fecure: it has water for firft-rate fhips of the line, and holds 400 merchant men, and 19 men of war. Ships may fail in and out with every wind, and are well fheltered in the harbour, particularly from the N. and E. winds, which are here the moft violent. For greater fafety two piers have been lately conftructed. Malaga has a confiderable trade, particularly with England, Its imports confift of broad cloths and iron ware, which it takes from the Englifh; of mercery, from Germany, and more efpecially from Hamburgh; and fpices, cutlery, tapes, and laces, from Holland. It furnifhes thofe countries, as well as Italy and the northern nations, with wine, fruits, fumac, anchovies, and oil. Its exportation of wine alone amounts to about 400,000 quintals yearly, and that of raifins to 250,000 quintals. The amount of the imports is valued at 1,800,000 piaftres, or 281,250*l.* fterling: that of the exports at 3,300,000 piaftres, or 515,625*l.* fterling; fo that the balance of trade is in its favour.

The foil in the vicinity of Malaga is fertile and well cultivated, producing great quantities of wheat and all forts of grain; and olive trees are abundant, fupplying 500 oil preffes in this diftrict alone. Fruit trees, fuch as the almond, fig, and lemon, are alfo very plentiful. The number of vineyards is immenfe, and they yield grapes of different fpecies and of delicate quality. About 300,000 quintals are dried annually: 750,000 quintals of wine are made yearly; of which about 400,000 are exported. The vineyards are cultivated with great labour and expence; the expence, as ftated by Mr. Townfend, being equal to $\frac{4}{5}$ths of the produce. In the diftrict of Malaga there are 14,000 wine-preffes, chiefly employed in making the rich wines, which, from the nature of the country, is called *mountain;* if red, from the colour, *vino tento,* known to us by the name of "tent." The manufactures of Malaga, which are inconfiderable, confift of one for fkins, leathers, and foles, and another of about 40 looms for filk ftuffs, velvets, taffetas, ferges, and filk cloth.

The inhabitants, blended with many foreigners, and occupying a beautiful country, in a mild climate and under a fine fky, are lively, induftrious, and active. The men are polite and prepoffeffing: the women, lively, gay, and alluring, accounted the moft agreeable in Spain.

Malaga *Bay*, a bay on the eaft coaft of the ifland of Leyta. N. lat. 10° 30′. E. long. 125 12′.

MALAGMA, formed of μαλασσω, *I foften*, a word ufed by fome authors to exprefs a cataplafm in general, of whatever nature, or made of whatever ingredients; but fome have ufed it only for emollient cataplafms.

MALAGRIDA, Gabriel, in *Biography*, a native of Milan, and a member of the fociety of Jefuits, who was burnt at an "auto da fè," at Lifbon, in the year 1761, as an heretic and falfe prophet. He had been fent out as miffionary to Portugal, where he became exceedingly popular, by his infinuating addrefs, and the fluency of his oratory: he was venerated as a faint, and confulted as an oracle. When the duke d'Aveiro was convicted of a confpiracy againft the life of the king of Portugal, Malagrida was accufed of being an accomplice in the plot: he was pronounced guilty of the charges exhibited againft him, but whether with or without juftice is a matter of difpute; at any rate, advantage was taken of it to banifh all the Jefuits from Portugal, excepting Malagrida and two others, who were referved for punifhment. To this probably the confent of the king could not be obtained, and, therefore, another method was adopted for getting rid of him. He was accufed of herefy; in proof of which, two of his treatifes were appealed to, *viz*, one entitled "Tractatus de Vita et Imperio Antichrifti;" and the other, written in the Portuguefe language, entitled "The Life of St. Anne, compofed with the Affiftance of the bleffed Virgin Mary and her moft holy Son." From thefe, feveral extracts were collected that were pronounced extremely heretical; and others were adduced to prove that he laid claim to the power of working miracles: and he alfo affumed that God himfelf had declared him his ambaffador, his apoftle, and prophet. He was burnt on the 21ft of September 1761.

MALAGUETTA, in *Geography*. See Grain *Coaft.*

MALAHA, a town of Perfia, in the province of Farfiftan; 90 miles E. of Schiras.

MALAHIDE, a fmall town of the county of Dublin, Ireland,

Ireland, situate on the Irish sea. There is a well here, dedicated to the Virgin Mary; and also a castle, now the residence of the Talbot family. It is two miles E. from Swords.

MALAI, a town of Arabia; 15 miles S. of Medina.

MALAKERY, a town of Hindoostan, in Mysore; 21 miles N.E. of Seringapatam.

MALALAIS, a small island in the sea of Mindoro. N. lat. 11° 18'. E. long. 120° 51'.

MALALEO, a port on the north-west coast of the island of Tappa, in the East Indian sea. N. lat. 0° 6'. E. long. 123° 35'.

MALAMBETO, a town of South America, in the province of Carthagena; 40 miles E. of Carthagena.

MALAMBO, or BARRANCA DE MALAMBO, a town of South America, in the province of Carthagena; 55 miles N.E. of Carthagena.

MALAMOCO, an island in the Adriatic, about four miles long and half a mile broad, near the city of Venice; upon which island is a town of the same name, containing about 1100 inhabitants. Besides the cathedral, which is the parochial church, it contains a nunnery, a church, and some neat buildings. This was anciently the chief town of the Venetians, the residence of government, and the see of a bishop. The port of Malamoco is situated at the farthest point of the shore, towards Chioggia, and is defended by two forts, *viz.* St. Pietro and Della Punta. It is the safest and most convenient port, and therefore most frequented; but on account of its sand-bars and shallows, ships cannot enter into it without pilots. At this port was constantly garrisoned some thousands of regular troops.

MALANDERS, MALANDRIA, a disease in horses, so called from the Italian *malandare, to go ill.*

It consists in certain ulcerous chaps, or chinks, appearing on the inside of the fore-legs, just against the bending of the knee, which void a red, sharp, and pungent humour.

This distemper may be cured by washing the parts with a warm lather of soap, or old chamber-ley; and then applying over the cracks a strong mercurial ointment, spread on tow, with which they should be dressed night and morning, till all the scabs fall off; but if this treatment fail, make an ointment of half an ounce of æthiops mineral, one dram of white vitriol, six ounces of soft green soap; and having clipped off the hair, and cleared away the scabs, anoint often with this, and apply the above unguent over the sores. When they dry up, give a gentle purge or two; or let the nitre balls be taken for two or three weeks. Bartlet.

After washing the parts with soap and water, Mr. Denny advises to rub on a powder, made by mixing together vitriolated zinc and alum, of each pulverized half an ounce twice a day. Mr. White recommends the following ointment, prepared by mixing two ounces of ointment of wax, one ounce of olive oil, oil of turpentine and camphor, of each a dram, and two drams of acetated water of litharge. For the same purpose, Mr. Ryding recommends to mix one ounce of strong quicksilver ointment and ten grains of muriated quicksilver in fine powder.

MALANEA, in *Botany*, received its name from Aublet, but has been referred by Schreber and Willdenow to another genus CUNNINGHAMIA (see that article). Jussieu and Lamark, however, retain the original name; but we are utterly incompetent to trace its derivation, of which Aublet himself gives no indication.

MALANEE, in *Geography*, a small island in the Florida stream. N. lat. 24° 56'.

MALANEO ISLANDS, two small islands in the North Pacific ocean, near the east coast of the island of Luçon, N. lat. 18° 2'. E. long. 122° 28'.

MALANGER, a town of Norway, at the northern extremity of the diocese of Drontheim.

MALANOVA, a town of Russia, in the government of Tobolsk, on the Irtisch; 28 miles N. of Tara.

MALAO, a town on the north-west coast of the island of Mindanao.

MALAPERT, CHARLES, in *Biography*, a learned Jesuit and excellent mathematician, was born at Mons in the year 1581. He entered into the order in 1600, and was afterwards elected professor of mathematics in Poland; and he next filled the same office in the Jesuits' college at Doway. In 1630 he was appointed, by order of Philip IV., mathematical professor in the new university at Madrid; but he died on his journey to that capital, being in the 50th year of his age. While he was in Poland he published a volume of poems, which have gone through many editions; but his most important works were mathematical. In one, entitled "Oratio de Laudibus Mathematicis," he treats of the phenomena of the newly-discovered Dutch telescope. He published the "Institutions of practical Arithmetic," and the "Elements of Geometry;" "A Paraphrase on the Dialectics of Aristotle;" and "Commentaries on the first six Books of Euclid."

MALAR. See MÆLER.

MALARIA, or MALARUM OSSA, in *Anatomy*, a pair of bones belonging to the face, and corresponding in situation to the cheeks. See CRANIUM.

MALARMAT, in *Ichthyology*, a name given by authors to the fish called by some *lyra altera*, and *cornuta*. It is a species of the trigla, and is distinguished by Artedi by the name of the trigla with many cirrhi, and with an octagonal body. See TRIGLA *Cataphracta*.

MALARUM OSSA, in *Anatomy*. See MALARIA.

MALASHLAH, in *Geography*, a town of Africa, situated on the Atlas, in the southern part of Algiers; 170 miles S. of Algiers.

MALATIA, a town of Asiatic Turkey, in Aladulia, situated on the west side of the Euphrates; the residence of a Jacobite and Nestorian bishop. This town was taken in 1400 by Timur Bec. The Mussulmen redeemed themselves by money, and the Christians were made slaves; 90 miles W.N.W. of Diarbekir. N. lat. 37° 56'. E. long. 38°.

MALATIVOE, a fortified port of Ceylon, in a romantic and delightful situation, between Trincomalee and Jafnapatam. Here the Dutch had a small factory, and a house for the commanding officer. It depended upon the garrison of Trincomalee, and was employed chiefly as a port of communication, and to collect provisions for that garrison. For these purposes, and to keep the natives in awe, a few Malay or Sepoy soldiers were stationed here; but it never was considered as capable of any defence. Close to the fort is a small village; and a river, which here falls into the sea, forms a harbour sufficient to admit small craft. The principal employment of the inhabitants is fishing; and with this article they supply the fort of Trincomalee. Cattle and poultry are abundant and cheap. Game is plentiful, and the woods abound with wild hogs and deer. Percival's Ceylon.

MALATS, in *Chemistry*, are salts formed by the union of malic acid with alkaline, earthy, or metallic bases. See MALIC *Acid*.

MALATZKA, in *Geography*, a town of Hungary; 14 miles N. of Presburg.

MALAVERD, a town of Persia, in the province of Irak; 45 miles N.E. of Ispahan.

MALA-

MALAUCENE, a town of France, in the department of the Vauclufe, and chief place of a canton, in the diftrict of Orange; 14 miles E. of Orange. The place contains 2506, and the canton 5458 inhabitants, on a territory of 185 kiliometres, in 7 communes.

MALAVISTA, a town of the ifland of Cuba; 36 miles W. of Villa del Principe.

MALAXIS, in *Botany*, a name applied by Profeffor Swartz to this new and very diftinct genus of the Orchis tribe, eftablifhed by Dr. Solander and himfelf. The word, μαλαξις, expreffes *foftnefs*, and feems to allude to the delicacy of habit and ftructure which marks thefe plants.—Swartz Act. Holm. ann. 1789. 127. t. 6. f. 2. ann. 1800. 233. t. 3. f. P. Prodr. 119. Orchid. 68. t. 1. f. P. Tracts on Botany, 162. t. 5. Schreb. 603. Willd. Sp. Pl. v. 4. 89. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 940. Michaux Boreal-Amer. v. 2. 157.—Clafs and order, *Gynandria Monandria*. Nat. Ord. *Orchideæ*, Linn. Juff.

Gen. Ch. *Cal.* Perianth reverfed, three-leaved, more or lefs acute, fpreading, permanent, two upper leaves equal; lower folitary, in front, deflexed. *Cor.* permanent. Petals two, linear, deflexed, fpreading, fmaller than the calyx. Nectary an afcending or erect lip, between the two upper calyx-leaves, embracing the organs of fructification with its concave bafe, its termination obtufe or acute, undivided or flightly lobed. *Stam.* Anther an hemifpherical, deciduous, obliquely terminal lid, of two cells; maffes of pollen folitary, feffile, oblong or globular, lying on the anterior margin of the top of the ftyle. *Pift.* Germen inferior, either oblong, fomewhat cylindrical, or obovate, erect, flightly gibbous, excavated in front and at the fummit; ftyle erect or afcending, fhort and thick; ftigma on the fide towards the lip, beneath the anther, concave. *Peric.* Capfule oblong or obovate, with three or fix ribs, of one cell and three valves, opening by clefts between the ribs. *Seeds* numerous, minute, each clothed with a chaffy tunic.

Eff. Ch. Calyx reverfed, fpreading. Petals deflexed. Lip afcending, concave at the bafe, without a fpur. Anther a terminal lid, deciduous.

Obf. This genus is moft allied to *Cymbidium* (fee that article) in character, but differs in its reverfed flower, as well as in its peculiar habit, indicated by the fmall, ufually yellow or greenifh bloffoms, and a general delicacy of ftructure and texture. In what regards the habit of the flowers, however, independent of their pofture, it muft be confeffed that *Cymbidium corallorrhizon* approaches *Malaxis* very nearly, though not at all in herbage.

1. M. *fpicata*. Sw. n. 1.—Leaves two, ovate, fhorter than their footftalks. Flower-ftalk fquare, racemofe. Lip obfcurely three-lobed, pointed.—Native of Jamaica. The *root* is perennial, confifting of an oblong upright *caudex*, with numerous downy fibres, appearing to grow amongft rotten wood or leaves. *Leaves* two, radical, fpreading, thin, delicate and pale, ovate, rather acute, entire, fomewhat wavy, ribbed, fmooth, about two inches long, each fupported by a membranous, ribbed, tubular, fheathing *footftalk*, about three inches long. *Flower-ftalk* about a foot high, folitary, radical, quadrangular, fmooth, fheathed by the footftalks at the bottom, and terminating in a corymbofe clufter of numerous, fmall, pale yellowifh *flowers*, each of whofe partial ftalks is half an inch, or more, in length, and has at its bafe a linear, acute, membranous, permanent *bractea*. The *lip* is acute, with a fmall lobe at each fide near the bafe, and has a dark central ftripe. This feems to be the fpecies which firft caufed the eftablifhment of the genus; yet it does not well anfwer to the generic character in Swartz's *Prodromus*, unlefs we conceive the central point of the lip to be bent backwards, while the two lateral lobes, projecting forward, have a heart-fhaped figure. The fpecific name is liable to objection, for the flowers are racemofe, or corymbofe, thofe of fome other fpecies being much more truly fpiked.

2. M. *umbellulata*. Sw. n. 2.—Leaves two, ovate, fhorter than their footftalks. Flower-ftalks five-angled. Umbel denfe. Lip obfcurely three-lobed, pointed.—Native of Jamaica, apparently in fimilar fituations with the foregoing, from which it differs chiefly in being of rather more humble ftature, with fmaller and greener *flowers*, growing in a little denfe umbel, at the top of the pentagonal ftalk.

3. M. *latifolia*. Leaves feveral, ovate, longer than their footftalks. Spike cylindrical. Bracteas deflexed. Lip three-lobed, the middle lobe largeft.—Native of the woods of Upper Nepal; gathered by Dr. F. Buchanan, Auguft 12th, 1802, at Narainhetty, where it is called by the inhabitants *Namly*. The *root* is like that of the former, with many ftrong, downy, twifted fibres. *Leaves* about four, on fhortifh, broad, ribbed, fheathing footftalks, broad-ovate, pointed, plaited, ribbed and ftriated, three or four inches long, being more than twice the length of their ftalks. *Flower-ftalk* central, folitary, above a foot high, erect, with feveral acute angles. *Spike* terminal, erect, cylindrical, denfe, many-flowered, three inches long. *Bracteas* folitary, deflexed, awl-fhaped, concave, membranous, permanent. *Flowers* feffile, fmall, yellow. *Germen* incurved, ftrongly furrowed, with crifped angles, its bafe tapering and elongated. Lower leaf of the *calyx* linear, reflexed at the fides, afcending at the point; two upper ones fhorter, half-ovate and obtufe. *Petals* linear, widely fpreading. *Lip* fhort, broad, erect, with three acute lobes, of which the middlemoft is the largeft, and entire, the fide ones ftained.

4. M. *odorata*. Willd. n. 6. (Katou-ponnam-maravara; Rheede Hort. Mal. v. 12. 55. t. 28.)—Leaves feveral, elliptic-lanceolate. Spike cylindrical. Bracteas deflexed. Lip heart-fhaped, cloven at the point.—Gathered by Dr. Buchanan on the moffy rocks of Upper Nepal, where it is called *Bun Pinali*. Rheede fays it loves funny retired places, flowering in January and February, and having a very delightful fmell. It has altogether the habit of the laft, but the *leaves* are narrower, and more elliptical than ovate. The *fpike* is longer, and *flowers* larger. The *lip* differs effentially, being of a broad heart-fhaped figure, cloven half way down at the upper part, or point, which is obtufe, and embracing the organs of fructification between the bafes of its rounded fide-lobes. The *flowers* are altogether of a pale dull yellow, or buff-colour.

5. M. *Rheedii*. Swartz. n. 4. Willd. n. 5.—(Epidendrum refupinatum; Forft. Prodr 61. Bafaala-poulou-maravara; Rheede Hort. Mal. v. 12. 53. t. 27.)—Leaves feveral, elliptic-lanceolate. Spike cylindrical. Bracteas deflexed. Lip inverfely heart-fhaped, rounded, fringed.—Native of the Eaft Indies and the Society Iflands, upon trees or rocks. We know it only by Rheede's and Forfter's works. It is nearly allied to the laft, and the *flowers* are faid to be delightfully fragrant, but are effentially different from thofe of M. *odorata*, not only in being much fmaller, and of a vermilion hue, but in the ftructure of their *lip*, which is inverfely heart-fhaped, its two rounded lobes being directed upwards; and their edge, moreover, is finely fringed.

6. M. *nervofa*. Swartz. n. 8. Willd. n. 10.—(Ophrys nervofa; Thunb. Jap. 27. Epidendrum nervofum; Thunb. Ic. Jap. t. 10.)—Leaves feveral, ovate, ribbed, acute. Stalk angular, racemofe. Bracteas minute, fpreading. Lip obovate, emarginate, reflexed, with a pair of tubercles at the

the base.—Gathered by Thunberg, flowering in May and June, near Osacca and Jedo in Japan, where it is called *Gin Ran*. It appears to differ from the last in having the *flowers* fewer, and much more distant, each supported by a slender partial stalk, forming a cluster, not a spike. By Thunberg's long and exact description it is evidently well referred by Swartz to this genus, with which its habit accords. The *calyx* consists of three equal linear leaves, two of which are lateral, the third lowermost. *Petals* lateral. *Lip* uppermost, twice as broad as the petals, obovate, emarginate, forming a sort of *galea*, bent backwards in the middle, marked with two callosities, and a furrow, at the base, without any spur. *Style* semi-cylindrical, curved upwards towards the lip. *Capsule* slender, twisted. The *flowers* are said to be purple, and the minute ovate *bracteas* are of the same colour.

7. M. *lancifolia*. Leaves several, ovato-lanceolate, ribbed, acute. Flowers spiked. Bracteas lanceolate, spreading. Lip obovate, abrupt, reflexed, convex.—Found by Dr. Buchanan in the woods at Suembu in Upper Nepal, July 17, 1802. Its affinity to the last did not escape its learned discoverer, but the present is rather a taller plant, being twelve or eighteen inches high. The *leaves* are much narrower and longer, about three or four in number, with long sheathing bases. *Stalk* angular, bearing a long slender spike of numerous green unspotted *flowers*, rather smaller than Thunberg delineates those of his *Ophrys nervosa*. The *bracteas* are lanceolate, and nearly as long as the germens. The *lip* has no tubercles at its base, but is bent back towards the middle, as is *M. nervosa*.

8. M. *ophioglossoides*. Willd. n. 3. (M. unifolia; Michaux Boreal-Amer. v. 2. 157. Swartz Orchid. 71.)—Leaf solitary, ovate, clasping the stem. Stalk with many angles. Lip cloven at the extremity.—Native of shady woods in North America. Sent from near Lancaster in Pennsylvania by the Rev. Dr. Muhlenberg. A delicate species, with much of the aspect of the two first, but distinguished from all hitherto discovered by its solitary *leaf*, which is ovate inclining to heart-shaped, acute, finely ribbed and reticulated, near an inch and a half long, clasping the stalk with its base, and sheathing two inches or more of the lower part with its close, tubular, radical *footstalk*. The *flower-stalk* is solitary, rising four or five inches above the leaf, pale, slender, with several unequal angles not exactly five, and terminating in a very delicate corymbose cluster, of numerous small greenish *flowers*, on capillary stalks, with a small, ovate, acute, membranous *bractea* at the base of each stalk. Willdenow observed the *lip* to be cloven; and its lobes appear to us to be distant and divaricated, with a semicircular sinus between them.

9. M. *monophyllos*. Swartz. n. 3. Willd. n. 4. (Ophrys monophyllos; Linn. Sp. Pl. 1342. Fl. Suec. ed. 2. 316. Wulf. in Jacq. Coll. v. 4. 340. t. 13. f. 2. O. monophyllos bulbosa; Loef. Pruss. 180. t. 57. O. lilifolia Suecica; Linn. Sp. Pl. 1341. n. 7. O. latifolia; Fl. Suec. ed. 2. 316. n. 811, on the authority of Dr Swartz. Epipactis n. 1293; Hall. Helvet. v. 2. 151. t. 36.)—Leaf nearly solitary, elliptic-ovate. Stalk triangular. Lip undivided.—Native of boggy shady alpine places, in Prussia, Sweden, Russia, Carniola, and, though very rarely, in Switzerland, flowering in the spring. This is closely allied in habit to the last. *Root* an aggregate bulb, with numerous fibres, and invested with several ribbed sheaths, altogether more like an *Allium*, as Wulfen observes, than any of the *Orchis* tribe. Such, however, is the nature of all the foregoing species, as far as has been ascertained. One elliptical, delicately ribbed, *leaf*, acute at each extremity, and running down into a long sheathing base, or radical *footstalk*, embraces the stalk, attended by one or two shorter external sheaths, and often accompanied by a much smaller internal leaf. The *stalk* is triangular, terminating in a long slender cluster, of very numerous small green *flowers*, with every character of the genus. Their *bracteas* are like those of the last, but their *lip* is undivided, with a taper point. Dr. Swartz assures us the *Ophrys latifolia* of Linnæus's *Flora Suecica*, (erroneously so printed for *lilifolia*,) was no other than a specimen of the species we are describing, in which the second leaf was more remarkable than usual.

10. M. *paludosa*. Swartz. n. 5. Willd. n. 7. Sm. Fl. Brit. 940. Engl. Bot. t. 72. (Ophrys paludosa; Linn. Sp. Pl. 1341. Fl. Suec. 316. Rose Elem. of Bot. append. 450. t. 2. f. 3. Dicks. H. Sicc. fasc. 7. 16. Ehrh. Phytoph. 16.)—Leaves several, spatulate, rough at the tip. Stalk with five angles. Lip undivided, concave, half the length of the calyx.—Native of turfy bogs in the north of Europe, flowering in July. It is found in Cambridgeshire, Bedfordshire, and on Felthorpe bogs a few miles north of Norwich, though now far more rare than formerly, from the general improvement of such grounds by draining. This is perhaps the smallest species of its genus, or even of the whole natural order. The *roots* consist of little bulbs, connected by a thread-shaped fibre, and exactly accord with those of the foregoing. The *leaves* are about four, sheathing, an inch long, spatulate, firm and rather fleshy, jagged or rough at the point, slightly glaucous. *Flowers* in a long dense cluster, of a yellowish-green. *Calyx-leaves* nearly equal, ovate. *Petals* rather smaller, reflexed. *Lip* erect, ovate, concave, undivided, but half the length of the calyx. *Germen* obovate.

11. M. *lilifolia*. Swartz. n. 6. Willd. n. 8. (Ophrys lilifolia; Linn. Sp. Pl. 1341. Andr. Repos. t. 65.)—Leaves two, ovate. Stalk triangular. Petals linear-thread-shaped. Lip prominent, obovate, acute. Style deflexed, recurved.—Native of wet places in Pennsylvania. The late Peter Collinson cultivated it about 50 years ago, and plants are from time to time brought to England, though seldom long preserved. This and the two following belong to a tribe which have not so clearly the character of *Malaxis* as could be wished. The *flower* is seldom truly reversed, though more or less turned, and the lip, of the present species at least, is rather directed forward than upward, while the column, or *style*, though curved upward, stands opposite, not parallel, to the lip. The whole habit, however, agrees so entirely in every point with *Malaxis*, and with nothing else, that Dr. Swartz has finally determined to place them here, rather than in the less natural genus of *Cymbidium*; especially as the position of their flowers will very often excuse, if not justify, the measure. The *root* of *M. lilifolia* is an ovate bulb, with a spongy reticulated coat, and many woolly fibres. *Leaves* two, radical, three or four inches long, equal, opposite, ovate, keeled, ribbed, bluntish, embracing each other at the base, and accompanied by one or two broad, short, external, sheathing scales. *Stalk* erect, straight, about twice as tall as the leaves, triangular, furrowed, terminating in a loose upright *cluster* of numerous *flowers*, as large as those of most of our common *Orchideæ*. The *calyx-leaves* are linear, half an inch long, spreading, of a pale yellowish-green. *Petals* whitish, as long but much narrower, almost capillary, dependent. *Lip* rather longer than the calyx, olive-green, projecting, somewhat recurved, obovate with a small point, channelled at the base. *Style* incurved, with a hooked tip to the cover of the anthers. *Germen* slender, furrowed, gradually swelling upwards, twisted.

12. M.

12. M. *cordifolia.* Leaf nearly folitary, heart-fhaped. Stalk furrowed. Petals linear-thread-fhaped. Lip prominent, inverfely heart-fhaped, with a fmall point. Germen acutely triangular.—Gathered by Dr. Buchanan, Oct. 2d, 1802, at Narainhetty in Upper Nepal. It grows in watery places, amongft dead leaves, in a micaceous foil. This is clofely allied to the laft, though abundantly diftinct as a fpecies. In fize they exactly agree. The *roots* of the prefent have a thick, fpongy, whitifh coat, and very long woolly fibres. There is one principal *leaf*, which is radical, heart-fhaped, pointed, ribbed, near three inches long and above two broad, with a fhortifh fheathing bafe or *footftalk*, enveloped in one or two fcales. Sometimes, if not always, there occurs, as in *M. monophyllos*, *n.* 9, a very fmall folded ovate leaf, in the bofom of the other. The *flower-ftalk* is twice as tall as the leaf, loofely racemofe. *Flowers* apparently very much like thofe of *M. lilifolia*, but the *lip* is obcordate with a fmall point, and the *germen* is very acutely triangular, becoming club-fhaped as it advances, ftraight, not twifted, with three very evident membranous or winged angles. We have only feen one dried fpecimen.

13. M. *Loefelii.* Swartz. n. 7. Willd. n. 9. (Ophrys Loefelii; Linn. Sp. Pl 1341. Sm. Fl. Brit. 935. Engl. Bot. t. 47. Dickf. H. Sicc. fafc. 9. 11. Ehrh. Herb. 110. O. lilifolia; Hudf. 389. O. paludofa; Fl. Dan. t. 877. O. diphyllos bulbofa; Loef. Pruff. 180. t. 58. O. bifolia bulbofa; Ger. em. 403. Cymbidium Loefelii; Swartz Nov. Act. Upfal. v. 6. 76.)—Leaves two, elliptic-lanceolate. Stalk triangular. Petals linear. Lip prominent, obovate, channelled, undivided, recurved.—Native of marfhes on a fandy foil, among rufhes, flowering in July, chiefly in the north of Europe. We have it in Cambridgefhire and Norfolk, but it is efteemed a rare plant, and confidering its hiftory and affinities, is certainly one of the moft interefting in our Britifh Flora. The habit of the *roots*, with their white fpongy covering and woolly fibres, exactly accords with the two laft defcribed, and indeed with *M. paludofa*, *n.* 10. The *leaves*, however, are much narrower than in *lilifolia* or *cordifolia*, and more refemble thofe of Lily of the Valley. The *flowers* alfo are fewer and fmaller, more frequently reverfed, with broader *petals*, and a yellow, obovate, flightly wavy, but not divided, *lip*, oppofite to which ftands the incurved *ftyle*. The *germen* is obovate, with fix angles. The late Mr. Pitchford, who firft met with this fpecies in Norfolk, exchanged his only fpecimen with Mr. Lightfoot, for above 60 of the rareft Britifh plants.

14. M. *enfiformis.* Leaves feveral, fword-fhaped, equitant, riblefs. Spike very long, dependent. Lip heart-fhaped, four-lobed.—This grows parafitically upon trees at Narainhetty in Upper Nepal, where it was gathered by Dr. Buchanan, November 13, 1802. It is a genuine *Malaxis*, though different in habit from the ufual afpect of the genus. The *root* confifts of long, ftrong, woolly fibres, with fcarcely any bulb. *Leaves* numerous, radical, two-ranked, equitant, feffile, a foot long, fword-fhaped, very acute, coriaceous, quite fmooth, without ribs, of a fine fhining grafs-green, feparating, by age or drying, at a kind of joint near the bafe. *Flower-ftalk* folitary, central, radical, roundifh, longer than the leaves, terminating in an extremely long, recurved or pendulous, denfe, cylindrical *fpike*, of innumerable fmall *flowers*, of a dull orange hue. They are truly reverfed, the *calyx-leaves* and *petals* ovate; the *lip* erect, longer than the petals; heart-fhaped at the bafe, where it embraces the fhort erect *ftyle;* four-lobed in the margin, the two middle lobes rather elongated. *Germen* fhort, elliptical, with fix ribs.

Such are all the fpecies that we can fatisfactorily refer to this genus, not without fcruples refpecting the 11th, 12th, and 13th. Three others, indicated as doubtful by Swartz, and adopted by Willdenow, we prefume, without the leaft hefitation, to exclude. Thefe are

M. *cernua,* Willd. n. 11. (Béla póla; Rheede Hort. Mal. v. 11. 69. t. 35.)

M. *nutans,* ib. n. 12. (Limodorum nutans; Roxb. Corom. v. 1. 33. t. 40.)

M. *caudata,* ib. n. 13. (Epidendrum caudatum; Linn. Sp. Pl. 1349. Helleborine florum foliis maculofis et longiffimis; Plum. Cat. 9. Ic. t. 177.)

Of thefe the two firft, natives of the Eaft Indies, appear to us to have the character of *Cymbidium,* (fee that article,) and not in any manner to accord with *Malaxis.* With them certainly agrees in genus the *Limodorum recurvum,* Roxb. Corom. v. 1. 33. t. 39, L. n. 9. Willd. as well as *Epidendrum terreftre* of the Linnæan herbarium, and a nondefcript fpecies from Dr. Buchanan.

The laft, *E. caudatum* of Linnæus, a plant we believe known to Plumier only, does indeed, by his plate, feem to have the reverfed flower of a *Malaxis;* but the habit is fo different, and the figure is fo incorrectly drawn, the calyx being reprefented interior with refpect to the petals, and the column extremely various and confufed, that we conceive nothing can fafely be deduced from it. We will neverthelefs venture to obferve, that if this fpecies be referrible, by its effential character, to *Malaxis,* fome new one muft be fought to define the genus, in order to exclude a plant fo foreign to it, and which evidently belongs either to *Cymbidium* or *Dendrobium.* In fuch cafes, however, no prudent botanift will truft to any figure, much lefs to fo inaccurate an one as that before us, but will fufpend his judgment till he can examine Nature herfelf. S.

MALAZKERD, in *Geography*, a town of Turkifh Armenia, on the Aras; 140 miles N.E. of Diarbekir. N. lat. 39°. E. long. 41° 59'.

MALBARY, a town of Hindooftan, in Vifiapour; 6 miles N.E. of Merritch.

MALBAY, a bay of the county of Clare, Ireland, on its weft coaft, which is deemed unfafe, and not frequented.—Alfo, a river of Canada, which runs into the St. Lawrence, 63 miles below Quebec.

MALBUNGAT, a town of Lower Carinthia; 15 miles S.W. of Villars.

MALBURY, a town of Bengal; 14 miles S.S.E. of Kifhenagur.

MALBY, a town of Sweden, in Weft Gothland; 35 miles E.N.E. of Uddevalla.—Alfo, a town of the fame province; 26 miles S.E. of Uddevalla.—Alfo, a town of Sweden, in the province of Skonen; 21 miles S. of Chriftianftadt.

MALCAPOUR, a town of Hindooftan, in Candeifh; 25 miles E.S.E. of Burhampour.

MALCHIN, a town of the duchy of Mecklenburg, on the Cummer lake, at the mouth of the river Peene. The ftates affemble here once in two years; 26 miles S.E. of Roftock. N. lat. 53° 4'. E. long. 12° 32'.

MALCHOW, a town of Mecklenburg; 40 miles S. of Roftock. N. lat. 53° 30'. E. long. 12° 33'.

MALCOLM, ALEXANDER, in *Biography*, author of "A Treatife of Mufic, fpeculative, practical, and hiftorical," thick 8vo., Edinburgh, 1721. This work, which has confiderable merit, is dedicated to the moft illuftrious directors of the Royal Academy of Mufic. (See OPERA.) We are old enough to remember feveral of the illuftrious perfonages who were fubfcribers to this eftablifhment, yet never

never heard of any one of them that was likely to read this book, colonel Blathwaite and general O'Hara excepted: the firſt a dilettante of eminence; the ſecond poſſeſſed of good taſte, and, from hearing and comparing great performers and good compoſitions, an excellent judge of muſical talents. The reſt were pleaſed they knew not why, and were drawn into the vortex of faſhion by example.

Upon a late peruſal of this work, which we had not ſeen for near half a century, we find in it indiſputable proofs of the author's learning, diligence, and knowledge. He has drawn from the pureſt ſources of information concerning ancient muſic, and does not ſeem ignorant of the modern. His chapters on compoſition, however, go but a little way into the myſteries of the art. He has indeed given common examples of the three ſpecies of movement in melody: *retto, obliquo,* and *moto contrario;* riſing and falling together; one part ſtationary, and the other moving up or down; and contrary motion. He has alſo given the treble and baſe of a few uſual cadences, in two parts only. But though his explanations, deſcriptions, and diſcuſſions are numerous, they are rendered ſo tedious and full of repetitions and amplifications, that many years ſtudy, experience, and reading, would be ſtill neceſſary for a ſtudent, after the moſt careful and attentive peruſal of this book, to render him a complete contrapuntiſt. His inſtructions are rendered obſcure, perhaps, by too great a deſire to render them clear: they are involved in too many words. "In vitium ducit culpæ fuga, ſi caret arte." The ſtyle is not alluring: it abounds in Scotticiſms, is rough, and often dark and uncouth. The work is too ſcientific for an elementary tract, and too ſuperficial in the rules for practical harmony. We well remember, at an early ſtage of ſtudy, to have taken up this book with a ſure and certain hope of finding in it a ſolution of all our doubts and difficulties; but ſoon laid it down in deſpair. The author ſeems to have begun at the wrong end of his labour, plunging into theory and ſpeculation before he ſpeaks of practice. The plates at the beginning have a hieroglyphic appearance, and muſt be totally unintelligible to inexperience; and the author ſeems deficient in that agreeable and faſcinating manner of writing, in the lively ſtrokes, and variety of occaſional inſtruction, which Bayle allows even to his enemy, Maimbourg. "There are few hiſtorians," ſays he, "even among thoſe who write better, and are more learned and exact, that have the art of engaging the reader's attention ſo much as he does." Though our author has read and meditated much, yet, by being ſelf-taught, there is an awkwardneſs of expreſſion in communicating his knowledge to his readers, which wanted practice and good taſte to render it clear, uſeful, and pleaſant.

As this work is become ſomewhat ſcarce, and was publiſhed before the Monthly and Critical Reviews were eſtabliſhed, we ſhall ſpecify ſome of the principal ſubjects which the author has treated, and the authorities upon which he builds. His doctrine of vibration is taken from s'Graveſande and Keil. He mentions Vincenzo Galileo, but not his more learned ſon. Kircher, Dr. Holder, and Dr. Wallis, are cited; the latter on his doubts concerning the vibrations which conſtitute intervals, from their celerity, as we are unable to count them. He conſiders ratios and coincidences under the guidance of Merſennus. He does not mention Galileo, in ſpeaking of the doctrine of pendulums; nor does he give any authorities in explaining arithmetical, harmonical, and geometrical proportions. Kepler is quoted, and Des Cartes, on the geometrical part of harmonics by dividing right lines. He denominates the loweſt ſound of a common chord the *fundamental,* five years before it was uſed by Rameau as the generator of a chord. The word *concinnous,* ſo frequently uſed by Graſſineau, ſeems adopted from Malcolm. Salmon's Temperament conſidered; and his propoſal for reducing all claſſes to one, diſcuſſed and approved. Solmiſation, according to the hexachords, he ſeverely cenſures. M. Laborde, in his "Eſſais ſur la Muſ.," has given a ſhort article to this work, without ſaying who or what the author was; but in the index, he calls him "Ecrivain Francois ſur la Muſique." None of our biographical dictionaries have honoured him with the leaſt notice; though he certainly ranks high among muſical writers in our own language. Walther, however, tells us from Mattheſon, that he was "ein geleheter Schottlandiſcher edilmann," a learned Scots nobleman. From the materials which he had collected, an ingenious and lively writer might have made a captivating and inſtructive work. The diſciples of Dr. Pepuſch, the only ſtudious muſicians of that time, condemned him for having diſputed the utility of ſolmiſation and the mutations, according to the hexachords. But Chambers, in the firſt edition of his Cyclopædia, was indebted to Malcolm for moſt of his muſical articles. And the French ſeem better acquainted with this book than the Engliſh, though we have never ſeen a tranſlation of it in that language; yet, in Rouſſeau and others, we perceive a frequent anonymous uſe of this book. The author has indeed often availed himſelf of Perrault's philoſophy of ſound, but not without naming him. He denies muſic in parts to the ancients, and ſeems to have been one of the firſt writers on the ſubject, who dared to doubt that a muſic, capable of ſuch miraculous effects as were aſcribed to it, ſhould be deficient in that part of modern muſic which affords us the greateſt pleaſure.

MALDA, in *Geography,* a town of Hindooſtan, in Mewar; 30 miles S.S.W. of Aſawully.

MALDE'E, a town of Perſia, in the province of Segeſtan; 141 miles E.N.E. of Zareng.

MALDEN, or MALDON, an ancient and populous borough and market town in the hundred of Dengey, and county of Eſſex, England, is ſituated ten miles diſtant from Chelmsford, and 37 from London, on the acclivity of an eminence S.W. of the eſtuary of the Blackwater, or river Idumanum. Many of our ancient topographers aſſign this place as the Camalodunum of the Romans: but this ſubject has been fully inveſtigated in the Beauties of England and Wales, vol. v. under COLCHESTER; which town ſee alſo in this work. The earlieſt mention of Malden, by hiſtorians, refers to the year 913, when Edward the Elder encamped here to impede the progreſs of the Danes: the entrenchment he formed lies on the W. ſide of the town, and appears to have been of an oblong form, and to have incloſed about twenty-four acres: three ſides of the ramparts may yet be traced; the other is defaced by buildings. Its ſtrength was probably conſiderable, as in 921 a great army of Danes beſieged it without effect. In 993 it was again attacked by the Daniſh forces commanded by Unlaf. In the Domeſday Survey, Malden is ſtyled a half hundred, and had then 180 houſes, and a hall held by the burgeſſes of the king, who had alſo a houſe here in his own poſſeſſion. When Malden was conſtituted a borough is uncertain: a charter appears to have been granted to the burgeſſes by Henry II. By another charter from queen Mary in 1553, the borough was incorporated, and its government veſted in two bailiffs, ſix aldermen, and eighteen capital burgeſſes. Two members are returned to parliament; the right of election is confined to thoſe who obtain their freedom by birth, marriage, or ſervitude; the number of voters is about 200. The firſt return was made in the year 1329. The cuſtom of Borough-Engliſh, by which the youngeſt ſon ſucceeds to the burgagetenement on the death of his father, ftill prevails here. The town confifts of one principal ftreet, extending nearly a mile eaft and weft, a crofs ftreet of confiderable length, and feveral fmaller avenues and back lanes. The defcent from the upper part to the river is very fteep: many of the houfes are refpectable, having been rebuilt within the laft fifty years. The import trade is confiderable; confifting of coal, iron, deal, corn, &c. At fpring-tides the river will bring up veffels that draw eight feet water; but the coals are brought to the town in lighters. Two fairs are held annually, and a weekly market on Saturdays. In the population furvey of the year 1801, the number of houfes was ftated to be 454, inhabited by 2358 perfons. Malden had formerly three parifhes, but two of them have long been confolidated. The principal church, that of All Saints, is an ancient and fpacious edifice, with a fquare tower terminated by a triangular fpire: in the fouth, or d'Arcy's aifle, three chantries were founded in the reign of Henry VI. by Robert d'Arcy, efq. of Danbury, feveral of whofe family were buried here. Near this church is the town-hall, which is a large and ancient brick building. St. Mary's church is a fpacious pile, fituated in the lower part of the town, and recorded to have been founded by Ingelric, a Saxon nobleman, previous to the Norman conqueft: the tower, with part of the church, was rebuilt in the reign of Charles I. St. Peter's, the parifh united to All Saints, had formerly a church, of which the tower only is now ftanding: attached to it is a building, erected by Dr. Thomas Plume, archdeacon of Rochefter, for a grammar fchool and library. This gentleman was born at Malden in 1630, and in the latter part of his life became a great benefactor to his native town, as well as to feveral other places. The books contained in the library were his own collection, and are ordered to be lent out for general ufe. He appropriated the rents of a farm at Iltney, to keep the fchool and library in repair. He alfo gave 200*l.* to build a workhoufe for the poor; and 1000*l.* more to eftablifh the trade of weaving fackcloth to employ them. The Plumian Profefforfhip of Aftronomy and Natural Philofophy at Cambridge was founded by a bequeft of 1902*l.* which he left for that purpofe. He died in 1704.

Richard de Gravefend, bifhop of London, about the year 1291, founded a fmall priory for Carmelites or White monks, in Malden, which continued till the diffolution. Several eminent fcholars are mentioned by Ball and others, as having been inmates of this monaftery.

In the forty-feventh volume of the Philofophical Tranfactions, is an account of Edward Bright, a fhop-keeper of this town, who was fo enormoufly fat, that his fize and weight are almoft unparalleled in the hiftory of the human race. At the age of twelve years and a half, his weight was 144lbs.; increafing in bulk as he grew up, in feven years more he weighed 336lbs. He increafed in bulk in nearly the fame proportion, and at the age of twenty-eight his weight was 584lbs.: this was the laft time he was weighed; but as he was manifeftly bigger at the time of his death, his weight muft then be upwards of 600lbs. His height was five feet nine inches and a half; and his circumference, round the belly, fix feet eleven inches. He died in 1750, aged 29; after his death feven men were buttoned in his waiftcoat. Till within a year or two of his death he was comparatively an active man; but afterwards his extreme corpulency rendered his life burthenfome. He left a widow pregnant of her fixth child.

Nearly one mile weft from Malden ftood Bileigh abbey, founded, in the year 1180, by Robert de Mantell, for monks of the Premonftratenfian order. Some parts of the monaftic buildings ftill remain, and are now connected with a fmall farm. The chapel is the moft perfect part; its roof is formed with very fine-grained lime-ftone, and has groined arches, fupported by three flender Purbeck columns. Henry Bourcher, earl of Effex, who died April 4, 1483, and Ifabel his wife, were buried here. Beauties of England and Wales, vol. v. Morant's Hiftory, &c. of Effex, 2 vols. folio.

Malden, a town of the county of Zutphen; feven miles E. of Borckeloe.—Alfo, a town of America, in Middlefex county, Maffachufetts, four miles N. of Bofton, containing 1059 inhabitants.—Alfo, a diftrict or townfhip of Effex county, in Upper Canada, occupying a confiderable extent, and fituated on the eaftern fide of Detroit river, about eighteen miles below the town of Detroit. At the lower end of the diftrict there are but few fcattered houfes; but at the upper end, bordering upon the river, and adjoining to the new Britifh poft that has been eftablifhed fince the evacuation of Detroit, a little town has been laid out, which is rapidly increafing. Hither feveral of the traders have removed, who formerly refided at Detroit. This little town and the new poft are denominated "The new Britifh town and poft near the ifland of Bois-Blanc," an ifland in the river near two miles in length, and half a mile in breadth, that lies oppofite to Malden.

MALDENANTRE, a fmall ifland near the coaft of Sardinia. N. lat. 40° 1'. E. long. 8° 13'.

MALDIVES, a clufter of fmall iflands in the Eaft Indian fea, about 270 miles S.W. of cape Comorin, amounting in number, as it is faid, to more than 1000, and moftly uninhabited. They form a kind of oblong inclofure, around a clear fpace of fea, with very fhallow water between one another. According to Mr. Dalrymple's chart, they feem to be divided into thirteen groups, nearly equi-diftant, and each bearing its proper name. The inhabitants of thofe that are occupied appear to be a mixture of Arabs and Indians of Malabar, from which coaft thefe iflands probably were originally colonized. They were difcovered in 1508 by the younger Almeyda, and conquered by the Portuguefe from the Moors, who had ufurped the fovereignty from the natives. The Portuguefe, however, were foon cut off by the original Maldives. Among the inhabitants, who are governed by a chief called *Atoll*, who are miferably poor, and who are governed in an oppreffive manner, there are fome Mahometans. Their language is the Singalefe: their articles of commerce are fails and cordage, cocoa-nuts, oil, honey, dry fifh, tortoife-fhell, and cowries, and thefe articles are collected in four ports. Thefe iflands lie in N. lat. 5° 30' to 7° 5'; and E. long. 72° 30' to 73° 45'.

MALDONADO, a town of South America, in the government of Buenos Ayres, on the river Plata; 100 miles W. of Buenos Ayres. S. lat. 34° 50'. W. long. 55° 36'.

MALDONAT, John, in *Biography*, a learned Spanifh Jefuit, was born near Lerena, in Eftramadura, in the year 1534. He purfued his ftudies at the univerfity of Salamanca, where he afterwards taught the Greek language and divinity with much fuccefs and applaufe. He affumed the habit of the order when he was at Rome, in the year 1562. In the following year he was appointed profeffor of philofophy in the college at Paris, which the Jefuits had juft founded in that city; after this he commenced a courfe of divinity in the fame feminary which occupied him four years. Thefe lectures were attended by a prodigious concourfe of fcholars, who would affemble two or three hours before the time in which the lectures began to infure themfelves places. In 1570 he was fent with nine other Jefuits to Poictiers, with the view of forming an eftablifhment of the order in that city, but in this they were unfuccefsful. He next re-

turned

turned to Paris, and refumed his lectures with great fuccefs. but in the midft of his labours he was interrupted by the exhibition of certain accufations againft him, one of which was, that by his influence over the mind of the prefident St. Andre, he had obtained a fraudulent will, by which his eftates were bequeathed to the Jefuits, and the other was an accufation of herefy, for maintaining that the doctrine of the immaculate conception of the Holy Virgin was not a point of faith. After a regular hearing he was acquitted of both thefe charges, but his mind was unhinged, and he determined to relinquifh his lectures, and to retire in a good meafure from the world. In his retreat at the college of Jefuits at Bourges, he employed himfelf in commentaries on the fcriptures, till he was called out of his obfcurity by pope Gregory XIII., to fuperintend the publication of "The Septuagint," at Rome. Here alfo he finifhed his Commentaries on the Gofpels, which was in 1582; and in the following year he fell fick, and died in the fifty-ninth year of his age. Maldonat was reckoned one of the ableft fcholars of the fociety to which he belonged: he was a capital linguift, an eloquent preacher, and a judicious commentator on the fcriptures. He is highly fpoken of by Dupin, father Simon, and other learned men. Simon, in reference to his qualities as a commentator and critic, fays, "he does not allow one difficulty to pafs without examining it to the bottom. When a great number of literal interpretations of the fame paffage prefent themfelves, he ufually fixes on the beft, without paying too much deference to the ancient expofitors, or even to the majority, regarding nothing but Truth alone, ftript of all authorities but her own." The principal works of Maldonat are "Commentarii in quatuor Evangeliftas;" "Commentarii in quatuor Prophetas, Hieremiam, Baruch, Ezekielem, et Danielem;" he was author of many other works, but they were all given to the world after the death of the author; and fome pieces have been attributed to his pen, which were not only unworthy of his high reputation, but which have generally been regarded as fpurious. Bayle. Moreri, &c.

MALDUAR, in *Geography*, a fmall circar of Bengal, between Dinagepour and Purneah, about nine miles long, and fix broad; which may be confidered as part of Rajemul. The chief town is Rahny.

MALE, the chief and moft fertile of thofe iflands called the "Maldives;" fituated nearly in the centre of the group, about four miles in circumference, and containing a town, in which the princes refide. N. lat. 6° 20'. E. long. 73° 10'.

MALE, the fex which has the parts of generation withoutfide, and which has ordinarily the pre-eminence over the other.

In this fenfe male ftands oppofed to female.

For the proportion of males to females, fee MARRIAGE.

MALE *Balfam Apple*, in *Gardening*. See MOMORDICA.

MALEBAYE, LA, in *Geography*, a town of Canada, on the river St. Laurence; 70 miles N.E. of Quebec.

MALEA, in *Ancient Geography*, *Capo Malio*, a town of Laconia, fituated at the extremity of a chain of mountains, advancing into the fea between the Argolic and Laconic gulfs.

MALEBRANCHE, NICHOLAS, in *Biography*, a celebrated philofopher, was born at Paris in the year 1638, and inftructed in the Latin and Greek languages by a domeftic tutor. He afterwards profecuted the ftudy of philofophy at the college of de la Marche, and of divinity in the Sorbonne. At the age of 22 years, he determined to embrace a monaftic life, and was admitted into the congregation of the Oratory. Weary of the refearches of ecclefiaftical hiftory, to which he firft directed his attention, he was advifed by father Simon to apply to oriental literature and biblical criticifm; but when he had acquired fufficient knowledge of the Hebrew language to read the Old Teftament in the original, he defifted from the purfuit of ftudies of this kind; and under the influence of a temporary enthufiafm, he feemed inclined to give himfelf up wholly to devotion, and filently to wait for divine illumination. But he was roufed from this ftate by the accidental perufal of Des Cartes's treatife "On Man," with the perfpicuous reafoning of which he was fo much pleafed, that he determined to make himfelf thoroughly acquainted with this author's fyftem of philofophy. With this view, he devoted ten years to profound meditation, and to metaphyfical refearches, which led him, under the influence of a warm and exuberant imagination, into the very vifionary regions of enthufiafm. Conceiving the foul of man to be myfterioufly united to his body, and apprehending alfo that a no lefs myfterious union fubfifted between the human foul and God, he publifhed, in 1673, the refult of his meditations and conclufions, in his famous treatife, entitled "Recherche de la Verité," or "Search after Truth," in three volumes, 12mo. In 1676, he attempted to evince the agreement between true philofophy and religion, in a work, entitled "Chriftian Converfations, in which the Truth of the Religion and Morality of Jefus Chrift is vindicated," 12mo. In 1680 appeared "A Treatife on Nature and on Grace," 12mo., which was the refult of a controverfy between him and M. Arnauld on the fubject of grace; and this treatife was fucceeded by feveral controverfial tracts, written by both thefe authors. He publifhed alfo feveral other pieces in vindication of his fyftem announced in the "Search after Truth." Our author alfo publifhed "A Treatife on Phyfical Premotion," againft Bourfier's book, "On the Action of God," and "Reflections on Light and Colours, and on the Generation of Fire," and alfo other papers, inferted in the "Memoirs of the Academy of Sciences," of which body he was admitted an honorary member in the year 1699. By temperance he maintained a good ftate of health, notwithftanding the delicacy of his conftitution, till near the clofe of life, which terminated at the age of 77 years, in 1715. His manners in private life were fimple, cheerful, and complaifant. He paid little regard to thofe fubjects of erudition which employed the thoughts and time of other literary perfons; and which merely ferved to make them acquainted with the opinions of different philofophers, without leaving them fufficiently at leifure to think for themfelves. For poetry he had no tafte; and it is faid, indeed, that he never read ten verfes without difguft. It was his cuftom to ftudy with his windows fhut, that he might not be difturbed by the light. The fpeculations of his retirement were the fubjects of his converfation, with regard to which he was communicative, and yet modeft and unaffuming. His company was much valued and defired; and no foreigner of learning vifited Paris without wifhing to be introduced to him; and we are informed by one of his biographers, that an Englifh officer, being taken prifoner in the war between the king of France and William III., expreffed his fatisfaction at being fent to Paris, becaufe he had long wifhed to fee Lewis XIV. and father Malebranche. See the next article.

MALEBRANCHISM, the doctrine or fentiments of father Malebranche (fee the laft article); which is in a great meafure the fame with Cartefianifm. It muft be owned, however, that though F. Malebranche thought the fame with Des Cartes, yet he does not fo properly feem to have followed him, as to have met with him.

Malebranchiſm is chiefly contained in the "Recherche de la Verité," of which M. Fontenelle ſays, "The Inquiry after Truth" is full of God: God is the only agent, and that too in the ſtricteſt ſenſe. All power of acting, all actions, belong immediately to him. Second cauſes are no cauſes. They are only occaſions that determine the actions of God; or occaſional cauſes. This work, which was firſt publiſhed in 1673, paſſed through ſeveral editions; the beſt of which was that publiſhed by himſelf in 1712, in two volumes 4to, and four volumes 12mo., with conſiderable variations and enlargements.

F. Malebranche, however, does not here lay down his ſyſtem entire, with regard to religion, or rather the manner in which he would reconcile religion to his ſyſtem of philoſophy; that he reſerved for his "Entretiens Chrétiens," already mentioned, where he proves the exiſtence of a God, the corruption of human nature by original ſin, and the neceſſity of a Mediator, and of grace.

Dr. Enfield, in his Abridgment of "Brucker's Philoſophy," (vol. ii.) has given the following account of the ſyſtem of Malebranche. "The doctrine of this book," referring to his 'Search after Truth,' "though in many reſpects original, is raiſed upon Carteſian principles, and is, in ſome particulars, Platonic. The author repreſents, in ſtrong colours, the cauſes of error, ariſing from the diſorders of the imagination and paſſions, the abuſe of liberty, and an implicit confidence in the ſenſes. He explains the action of the animal ſpirits, the nature of memory; the connection of the brain with other parts of the body, and their influence upon the underſtanding and will. On the ſubject of intellect, he maintains, that thought alone is eſſential to mind, and deduces the imperfect ſtate of ſcience from the imperfection of the human underſtanding, as well as from the inconſtancy of the will in inquiring after truth. Rejecting the ancient doctrine of *ſpecies* ſent forth from material objects, and denying the power of the mind to produce ideas, he aſcribes their production immediately to God; and aſſerts, that the human mind immediately perceives God, and ſees all things in him. As he derives the imperfection of the human mind from its dependence upon the body, ſo he places its perfection in union with God, by means of the knowledge of truth and the love of virtue."

"Singular and paradoxical as the notion of 'ſeeing all things in God,' and ſome other dogmas of this writer, muſt have appeared, the work was written with ſuch elegance and ſplendour of diction, and its tenets were ſupported by ſuch ingenious reaſonings, that it obtained general applauſe, and procured the author a diſtinguiſhed name among philoſophers, and a numerous train of followers. Its popularity might, perhaps, be in part owing to the appeal which the author makes to the authority of St. Auguſtine, from whom he profeſſes to have borrowed his hypotheſis concerning the origin of ideas. The immediate intercourſe which this doctrine ſuppoſes, between the human and the divine mind, has led ſome to remark a ſtrong reſemblance between the notions of Malebranche, and thoſe of the ſect called Quakers."

Dr. Reid (Eſſay ii.) does not allow, that either Plato or the latter Platoniſts, or St. Auguſtine, or the Myſtics, thought, that we perceive the objects of ſenſe in the divine ideas. This theory of our perceiving the objects of ſenſe in the ideas of the Deity, he conſiders as the invention of Father Malebranche himſelf. Although St. Auguſtine ſpeaks in a very high ſtrain of God's being the light of our minds, of our being illuminated immediately by the eternal light, and uſes other ſimilar expreſſions; yet he ſeems to apply thoſe expreſſions only to our illumination in moral and divine things, and not to the perception of objects by the ſenſes. Mr. Bayle imagines that ſome traces of this opinion of Malebranche are to be found in Amelius the Platoniſt, and even in Democritus; but his authorities ſeem, as Dr. Reid conceives, to be ſtrained. Malebranche, with a very penetrating genius, entered into a more minute examination of the powers of the human mind than any one before him; and he availed himſelf of the previous diſcoveries made by Des Cartes, without ſervile attachment. He lays it down as a principle admitted by all philoſophers, and in itſelf unqueſtionable, that we do not perceive external objects immediately, but by means of images or ideas of them preſent to the mind. "The things which the ſoul perceives," ſays Malebranche, "are of two kinds. They are either in the ſoul, or without the ſoul: thoſe that are in the ſoul are its own thoughts, that is to ſay, all its different modifications. The ſoul has no need of ideas for perceiving theſe things. But with regard to things without the ſoul, we cannot perceive them but by means of ideas." He then proceeds to enumerate all the poſſible ways by which the ideas of ſenſible objects may be preſented to the mind: either, 1ſt, they come from the bodies, which we perceive; or, 2dly, the ſoul has the power of producing them in itſelf; or, 3dly, they are produced by the Deity in our creation, or occaſionally as there is uſe for them; or, 4thly, the ſoul has in itſelf virtually and eminently, as the ſchools ſpeak, all the perfections which it perceives in bodies: or, 5thly, the ſoul is united with a Being poſſeſſed of all perfection, who has in himſelf the ideas of all created things. The laſt mode is that which he adopts, and which he endeavours to confirm by various arguments. The Deity, being always preſent to our minds in a more intimate manner than any other being, may, upon occaſion of the impreſſions made on our bodies, diſcover to us, as far as he thinks proper, and according to fixed laws, his own ideas of the object; and thus we ſee all things in God, or in the divine ideas.

However viſionary this ſyſtem may appear on a ſuperficial view, yet when we conſider, ſays Dr. Reid, that he agreed with the whole tribe of philoſophers in conceiving ideas to be the immediate objects of perception, and, that he found inſuperable difficulties, and even abſurdities, in every other hypotheſis concerning them, it will not ſeem ſo wonderful that a man of very great genius ſhould fall into this; and probably it pleaſed ſo devout a man the more, that it ſets in the moſt ſtriking light our dependence upon God, and his continual preſence with us. He diſtinguiſhed more accurately than any philoſopher had done before, the objects which we perceive from the ſenſations in our own minds, which, by the laws of nature, always accompany the perception of the object: and in this reſpect, as well as in many others, he had great merit. For this, as Dr. Reid apprehends, is a key that opens the way to a right underſtanding, both of our external ſenſes, and of other powers of the mind.

It is obvious, however, that the ſyſtem of Malebranche leaves no evidence of the exiſtence of a material world, from what we perceive by our ſenſes; for the divine ideas, which are the objects immediately perceived, were the ſame before the world was created. Malebranche ſaw and owned this conſequence, and therefore he reſts the complete evidence which we have of the exiſtence of matter upon the authority of revelation; by which we are aſſured, that God created the heavens and the earth, and that the word was made fleſh. No author, not even biſhop Berkeley, hath ſhewn more clearly, that either upon his own ſyſtem, or upon the common principles of philoſophers, with regard to ideas, we have

have no evidence left, either from reafon or from our fenfes, of the exiftence of a material world. It is no more than juftice to Father Malebranche to acknowledge, that bifhop Berkeley's arguments are to be found in him in their whole force.

Malebranchifm, notwithftanding, appears to many perfons not only illufive and vifionary, but even dangerous, and deftructive to religion; and it has accordingly been vigoroufly oppofed by many zealous French authors. The firft was M. Foucher. After him came M. Arnauld; and in 1715, F. du Tertre, a Jefuit, publifhed an ample confutation (as he imagines) of his whole fyftem. It was alfo charged with atheifm by F. Hardouin, in the "Atheifts Unmafked;" though his fyftem, formed by a warm and exuberant imagination, tends more to fanaticifm and enthufiafm than to atheifm. That part which relates to our feeing all things in God, was anfwered by Mr. Locke, in a fmall tract printed among his pofthumous works.

Thofe who choofe to fee this fyftem, attacked on the one hand and defended on the other, with fubtilty of argument and elegance of expreffion, and on the part of Arnauld with much wit and humour, may find fatisfaction by reading Malebranche's Enquiry after Truth; Arnauld's book of True and Falfe Ideas; Malebranche's Defence; and fome fubfequent replies and defences. It fhould be remembered, however, that Malebranche was a Jefuit, and Arnauld a Janfenift; and the antipathy between the Jefuits and Janfenifts left Malebranche no room to expect quarter from his learned antagonift. Bayle juftly remarks on this controverfy, that the arguments of M. Arnauld againft the fyftem of Malebranche were often unanfwerable, but they were capable of being retorted againft his own fyftem; and his ingenious antagonift well knew how to ufe this defence.

Mr. Norris, an Englifh divine, efpoufed the fyftem of Malebranche in his "Effay towards the theory of the ideal or intellectual World," publifhed in two volumes 8vo. A.D. 1701.

MALECKH, in *Geography*, a town of the duchy of Stiria; eight miles N. of Fridaw.

MALECOTTA, a town of Hindooftan; 42 miles E. of Cochin.

MALEDICTION, MALEDICTIO, in *Law*, a curfe ufually annexed to donations of lands, &c. to churches and religious houfes; imprecating the moft direful punifhments on thofe who fhould infringe them.

MALEENSOONOO, in *Geography*, a fmall ifland in the Eaft Indian fea, near the S.W. coaft of Palawan. N. lat. 8° 11'. E. long. 117° 22'.

MALEEPOETHAS, one of the Soloo iflands, in the Eaft Indian fea. N. lat. 6° 3'. E. long. 120° 18'.

MALEGHERY, a town of Hindooftan, in Myfore; 20 miles S. ofOuffoor.

MALEK SHAH, in *Biography*, third fultan of the Seljukian dynafty, and the moft powerful prince of his time, born in 1054, was fon, heir, and fucceffor of Alp Arflan. On the death of his father he found himfelf placed on a throne which had the rule of Afia from the banks of the Oxus to the borders of Syria. The caliph of Bagdad conferred upon him the facred title of commander of the faithful, which had never before been conferred on a fubordinate prince. Malek had many enemies to contend with, fome of whom were among his neareft relations. In 1075 one of his generals took Damafcus, and reduced a great part of Syria. He invaded Egypt the following year, but was compelled to retreat by the inhabitants of Cairo. In 1078 Malek Shah undertook to complete the conqueft of Turkeftan, which had been commenced by his father. He reduced many cities to obedience, and extended a nominal fovereignty over the Tartar kingdom of Cafhgar. And by allowing his generals to conquer diftricts for themfelves, acknowledging his paramount authority, he ftretched his authority from the Chinefe frontier to the mountains of Georgia, the vicinity of Conftantinople, the Egyptian border, and the coafts of Arabia. His activity was fo great that he is faid to have vifited all parts of his dominions twelve times during his reign. In thefe wide and extenfive progreffes his favourite amufement was hunting, which he purfued with vaft pomp, and fometimes with a train of many thoufand horfemen. In 1088 he made a pilgrimage to Mecca, in which he difplayed more magnificence than any prince had done before on the fame occafion. He abolifhed the tribute ufually paid by pilgrims: he furnifhed them all with provifions, caufed a great number of wells and refervoirs to be made in the defert, and erected places for reft and refrefhment at the different ftages, and he took every means of promoting the profperity of his dominions, by the erection of public buildings, by diminifhing the taxes, and by attending to the exact and rigid adminiftration of juftice. The reformation of the kalendar was one of the acts which diftinguifhed his reign; for which purpofe he affembled all the aftronomers of the Eaft to rectify the errors that had crept into the computations, and they inftituted the Jalalean era, fo named from Jalal, the firft word of one of the fultan's titles, which era is reckoned to commence from March 15th, 1079. Much of the fplendour and excellence of this reign was attributed to the illuftrious vizir Nizam al Molk, who towards the clofe of it fell into difgrace, though very undefervedly, and who was not only deprived of his employments, but in the 93d year of his age fell by the hand of an affaffin. The wound, though fatal, did not prevent him previoufly to his death, from writing a dignified epiftle to his fovereign, afferting his fidelity, and recommending his fon to the fultan. Malek, proceeding to Bagdad, with the intention, it is faid, of fixing there the feat of his empire, and removing the caliph to fome other place, was taken ill of a fever, which put an end to his life in 1092, in the 38th year of his age and the 21ft of his reign. This prince is highly extolled for his mental and bodily qualities, and for many virtues that adorn a throne. The houfe of Seljuk attained its higheft greatnefs in his perfon, from which it declined at his death, or rather at the death of his minifter Nizam. Gibbon. Univer. Hift.

MALEL, or MELLI, in *Geography*, a town of Nigritia, on a river which runs into the Niger. N. lat. 13° 40'. E. long. 9° 36'.

MALELA, or MALELES, JOHN, in *Biography*, a monk of Antioch, known chiefly by a chronicle, written in the Greek language, from the creation to the reign of Juftinian. It was publifhed from a manufcript in the Bodleian library, by Edward Chilmead, of Oxford. It has been republifhed as a kind of appendix to the Byzantine hiftorians at Venice, in 1733.

MALEMBO, in *Geography*, a fea-port of Africa, in the kingdom of Cacongo. It contains about 700 huts or houfes, and is furrounded by a wall conftructed of rough ftones, without mortar. The king has a palace here in which he occafionally refides. The Dutch and Portuguefe have warehoufes for ivory and raw minerals, which they obtain in exchange for European goods; 15 miles S.W. of Cacongo.

MALERMI, fometimes called MALERBI, NICHOLAS, in *Biography*, a native of Venice, and by profeffion a monk, is entitled to a fhort notice, as having been the author of the

firft

first printed version of the fcriptures into the Italian language, which was publifhed in two volumes folio, in the year 1471, under the title of "Biblia volgare Iftoriata." It was reprinted in 1477, and again in 1481. He was author alfo of "The Lives of all the Saints," publifhed at Venice in 1475.

MALESHERBES, Christian-William de Lamoignon de, born at Paris in 1721, was fon of the chancellor of France, William de Lamoignon, a defcendant of an illuftrious family. He received his early education at the Jefuits' college, and afterwards applied himfelf with ardour to the ftudy of the law, and to other fubjects connected with political economy. At the age of twenty-four he was appointed a counfellor in the parliament of Paris, and in December 1750 he fucceeded his father as prefident of the "court of aids," an important jurifdiction, the duties of which were to regulate the public taxes. The fuperintendance of the prefs had been conferred upon Malefherbes by his father, at the fame time that he received the prefidentfhip of the court of aids, and this function, which had ufually been exercifed to the fuppreffion of all free enquiry, became in his hands the means of promoting it to a degree beyond all former example in that country. It was through his favour that the French Encyclopédie, the works of Rouffeau, and the writings of other eminent men, iffued from the prefs, notwithftanding the oppofition and anathemas of the hierarchy. In this view of the fubject, Malefherbes, as well as the philofophical party with whom he was affociated, may be charged with having been materially inftrumental in preparing the way for that revolution which has been the pregnant fource of fo many calamities. In 1771, when the tyranny of the government had proceeded to the diffolution of the whole legal conftitution, and the banifhment of parliaments, the court of aids participated in the general deftruction, which it provoked by its remonftrances. Malefherbes was banifhed to his country-feat by a "lettre de cachet," and the duke de Richelieu, at the head of an armed force, abolifhed the tribunal. He was diftinguifhed by his private virtues, and his time was occupied with his family and his books, and the cultivation of his grounds. His expenditure in public objects was large: he drained marfhes, cut canals, conftructed roads, built bridges, planted walks, and carried his attention to the comfort of the lower claffes fo far, as to raife fheds on the fides of the river for the fhelter of the women at their domeftic labours. Thus he fulfilled the part of the beneficent parent of a village, till the acceffion of Lewis XVI. recalled him to a public ftation, and in 1774 Malefherbes received an order to appear at the place where the court of aids had fat, and refume the prefidentfhip of the reftored tribunal. On this occafion he pronounced a very affecting and patriotic harangue, and afterwards addreffed the king in an eloquent fpeech of thanks. He particularly inveighed againft that fpirit of defpotifm which had abrogated law and juftice, and abolifhed every veftige of conftitutional liberty. Such fentiments were in perfect unifon with thofe of the young and uncorrupted king, and they procured for Malefherbes the appointment of minifter of ftate in June 1775. This elevation was regarded by him only as affording an opportunity of extending his fphere of ufefulnefs. One of his firft concerns was to vifit the prifons, and reftore to liberty the innocent victims of former tyranny, and his praifes were carried throughout France by perfons of all defcriptions returning to the bofoms of their families from the gloom of dungeons. He was defirous of abolifhing the arbitrary power of iffuing lettres de cachet, but not being able to effect this great reform, he procured the appointment of a commiffion, compofed of upright and enlightened magiftrates, to which every application for fuch letters fhould be fubmitted, and whofe unanimous decifion fhould be requifite for their validity. Malefherbes was alfo a great encourager of commerce and agriculture, in which he had the cordial cooperation of the illuftrious Turgot, at that period the comptroller of the revenue. The latter was foon difmiffed from his high office by the intrigues of courtiers, and the former, owing to the rejection of fome important meafures, which his zeal for the public good led him to propofe, refigned his poft in the month of May 1776. To obtain an accurate view of the manners and policy of other countries and foreign ftates, he fet out on his travels, and vifited Switzerland and Holland, and in the courfe of his journey he noted down every occurrence worthy of obfervation, and that might, hereafter, poffibly be ufeful to himfelf, and promote the melioration of his country. On his return, at the end of a few years, he found his native country fo much advanced in philofophical principles, that he was encouraged to draw up and prefent to the king two elaborate memoirs, one on the condition of the Proteftants, the other on the principles of civil liberty, and toleration in general, replete with the enlarged views of an enlightened ftatefman, who was at the fame time a friend to the interefts and happinefs of mankind. Difficulties were now accumulating in the management of the government, and the king, in 1786, called Malefherbes to his councils, but without appointing him to any particular poft in the adminiftration. He foon found it impoffible to act with the men already poffeffed of the powers of government, but he was determined, in this critical ftate of things, to make one effort for opening the monarch's eyes, and drew up two energetic memoirs "On the Calamities of France, and the Means of repairing them;" but fuch was the afcendancy which the queen's party had over the mind of the king, that he was prevented from even reading them, nor could he be prevailed upon to grant the writer one private interview; he therefore took his final leave of a court, apparently bent on its own and the nation's ruin. He retreated to his country refidence, determined to confult the beft means of ferving his country by philofophical and agricultural purfuits, and in 1790 publifhed "An Effay on the Means of accelerating the Progrefs of Rural Economy in France," in which he propofed an eftablifhment to facilitate the national improvement in this important point. He was particularly led to make his propofal at this period, with the hope that the revolutionary changes, though fo awful and fanguinary, would finally iffue in a free and well balanced conftitution. The dreadful fcenes which very foon followed in horrible fucceffion extinguifhed his hopes, and left him to mourn in folitude over the miferies of France. Every energy of his foul was, at length, roufed, by the decree of the national convention for the trial of the dethroned and imprifoned king. He now feemed wholly to forget the neglect which had been offered him by the court, at a time when his advice might have effentially ferved it, and he felt nothing but the defire of ferving the king and his family with the utmoft extent of his talents. He accordingly wrote to the prefident of the convention, requefting the liberty of being permitted to act as one of the counfel of the fallen monarch. Three had already been appointed, but one having, from prudential motives, declined the office, Lewis, who wept at this proof of attachment from his old fervant, immediately nominated Malefherbes in his ftead. Their interview was extremely affecting, and Lewis, during the fhort interval before his death, fhewed every mark of affection for, and confidence in, his generous advocate. Malefherbes was the perfon who announced to him his cruel doom, and was one of the laft who took leave of him previoufly to his execution. After that

cataftrophe

cataftrophe he again withdrew to his retreat, and with a deeply wounded heart, refufed to hear any thing of what was acting among the blood-thirfty Parifians. As he was one morning working in his garden, he obferved four favage looking wretches directing their courfe to his houfe, and haftening home, he found them to be officers from the revolutionary tribunal come to arreft his daughter and her hufband, who had formerly been prefident of the parliament of Paris. The feparation of thefe perfons from his family was deeply afflicting to his heart, and it is probable that his own arreft fhortly after was a relief to his feelings. He had long been efteemed as father of the village in which he lived, and the ruftic inhabitants crowded round to take leave of their ancient benefactor with tears and benedictions. Four of the municipality accompanied him to Paris, that he might not be efcorted by foldiers like a criminal. He was fhut up in prifon with his unfortunate family: and in a few days the guillotine feparated his fon-in-law Lepelletier from his wife; and the accufation of Malefherbes with his daughter and grand-daughter, "for a confpiracy againft the liberties of the people," was followed, as a matter of courfe, by a fentence of death. The real crime, as it was bafely denominated, of this excellent man and worthy patriot, and which the convention never pardoned, was his defence of the king, an act in which he gloried to the lateft hour of his exiftence. He probably thought it an honour to die by the fame ruffian hands that had fpilt the blood of his mafter. The condemnation of the females almoft overcame the manly fortitude which he difplayed in every perfonal fuffering; his courage, however, returned at the prifon, and they prepared for the death which was the laft and only important event that they had to encounter. His daughter had exhibited the noble fpirit with which fhe was infpired, for upon taking leave of Mademoifelle Sombreuil, who had faved her father's life on the fecond of September, fhe faid to her, "You have had the happinefs to preferve *your* father, I fhall have the confolation of dying with *mine*." On the fatal day, Malefherbes left the prifon with a ferene countenance, and happening to ftumble againft a ftone, he faid with much pleafantry, "a Roman would have thought this an unlucky omen, and walked back again." Thus perifhed the venerable Malefherbes in April 1794, when he had attained to his feventy-third year. He was unqueftionably one of the moft fpotlefs and exemplary characters of his time. The fubfequent government has fince made fome reparation for the injuftice done him, by ordering his buft to be placed among thofe of the great men who have reflected honour upon their country. Gen. Biog.

MALESHERBES, in *Geography*, a town of France, in the department of the Loiret, and chief place of a canton, in the diftrict of Pithiviers; 10 miles N.E. of Pithiviers. The place contains 945, and the canton 6587 inhabitants, on a territory of $242\frac{1}{2}$ kiliometres, in 22 communes.

MALESTROIT, a town of France, in the departmen of Morbihan, and chief place of a canton, in the diftrict of Ploermel; 7 miles S. of Ploermel. The place contains 1800, and the canton 11,734 inhabitants, on a territory of 255 kiliometres, in two communes. N. lat. 47° 49'. W. long. 2° 18'.

MALEVANT, a fmall ifland in the Englifh channel, near the coaft of France. N. lat. 47° 22'.

MALEUS SINUS, in *Ancient Geography*, the gulf of Malea, called by the pirates who infefted it the golden gulf, on account of the rich prizes which they captured here.

MALEXANDER, in *Geography*, a town of Sweden, in Weft Gothland; 25 miles S. of Linkioping.

MALEYA, a town on the S. coaft of the ifland of Ternate, where the Dutch have a fettlement. N. lat. 8° 55'. E. long. 12° 14'.

MALGARDEN, a town of Weftphalia, in the bifhopric of Ofnabruck; 3 miles W.S.W. of Vorden.

MALGRATO, a town of Italy, in the department of the Lario; 10 miles N.E. of Como.

MALHAR, a town of Hindooftan, in Vifiapour; 20 miles E of Poonah.

MALHATTY, a town of Bootan; 60 miles N. of Dinagepour.

MALHERBE, FRANCIS DE, in *Biography*, a celebrated French poet, was born about the year 1556 at Caen, in Normandy. His father, who was an inferior law-officer, embraced the Calviniftical doctrines a fhort time before his death, which fo much difpleafed the fon, whofe governing maxim on this point was, "That a gentleman's religion fhould be that of his prince," that he left his native province, and entered into the houfehold of Henry d'Angoulême, natural fon of king Henry II., and governor of Provence. Little is known of the fubject of this article, till he was mentioned by Perron to Henry IV., as one who had furpaffed all other compofers of French poetry: two or three years after this time, *viz.* in 1605, Malherbe firft came to court, being then about 50 years of age. The king received him into his fervice, and gave him a liberal falary, and after the death of the monarch he had a penfion from the queen dowager. He died at Paris in 1628. He is reprefented as of a very unamiable temper; fplenetic and farcaftic, and as having little feeling for the common charities of his kindred. He was perpetually engaged in lawfuits, and his bon mots were frequently rude and fevere: to a young lawyer who fhewed him a poem of his own compofition, he faid, "Had the alternative been given you of being hanged or writing thefe verfes, you might have been excufed producing fuch a ridiculous piece." Dining once with the archbifhop of Rouen, he fell afleep after dinner: the prelate waked him to go and hear a fermon he was to preach: "I can," faid Malherbe, "fleep well enough without that." His ruling paffion was that of guarding the purity of the French language, of which he exhibited a proof almoft in his dying moments, when he reproved his nurfe for ufing a word that was not of good authority: and it is farther faid, that when his confeffor was defcribing to him the happinefs of a future world in mean and vulgar terms, he exclaimed, pray fay no more, your ftyle is too difgufting to be borne. With all his defects Malherbe is revered as the father of cultivated French poetry. His works confift of odes, ftanzas, fonnets, epigrams, fongs, and other fhort pieces, fome of which are merely complimentary addreffes to the great, and fome are of a devotional caft. The beft editions of his works are in 3 vols. 12mo. 1722; and in octavo 1756, edited by St. Marc. Moreri.

MALHEUREUX, in *Geography*, a fmall ifland in the gulf of Mexico, near the coaft of Weft Florida. N. lat. 30° 6'. W. long. 89° 28'.

MALIANA, or MANIANA, a town of Algiers, much frequented by pilgrims, on account of the tomb of a faint, called "Sede Youfeph;" 12 miles S.S.E. of Tefeffad.

MALIC ACID, in *Chemiftry*, is a vegetable compound, which exifts ready formed in many unripe fruits; and contributes, almoft exclufively, to give fournefs to the apple, the barberry, the plum, and the floe. It was difcovered by Scheele in the year 1785. He has given us the following procefs for extracting it, in Crell's Chemical Journal for that date. Saturate the juice of unripe apples with carbonat of potafh, and to the folution add acetat of lead till a turbidnefs ceafes to be produced. The precipitate, which is a compound of the malic acid with oxyd of lead, muft be wafhed in a large quantity of water, and afterwards treated with dilute fulphuric acid; frefh portions being poured on, until the mixture has loft its faturnine flavour, and become perfectly four. The malat of lead, by this treatment, will be decompofed, a fulphat being formed in its place, and the malic acid remaining free in the fupernatant liquor. To feparate them the fluid muft be paffed through a filter. Vauquelin has fince afcertained, that the acid in queftion may be obtained from the *fempervivum tectorum*, or common houfe leek, more advantageoufly even than from the apple. It exifts in this vegetable combined with lime; and the mode of operating, which he has recommended, differs but little from the preceding, except in adding acetat of lead to the expreffed juice, without the previous intervention of carbonat of potafh. Annales de Chimie, t. 34. p. 127.

Befides the above proceffes for extracting malic acid, it may alfo be formed artificially by the action of nitric acid upon fugar. If equal quantities of nitric acid and fugar be beat together, till the mixture affumes a brown colour, two new acids will be found to have been created, having very different properties from the one originally employed. The moft abundant of thefe is the oxalic, or that which gives fournefs to the *oxalis acetofella*, or common wood forrel, whence its name, and which will be more particularly treated of under that article. (See Oxalic *acid*.) The other is the malic; and the mode of feparation employed by Scheele, who was the difcoverer of this fact, is as follows: Add lime-water till a precipitate ceafes to be produced; and after having filtered the liquor, prefent a farther quantity, fufficient to neutralize the malic acid. Alcohol muft next be poured in, which will caufe a coagulation to take place. The product is a malat of lime, which, when feparated by the filter, and wafhed with frefh alcohol, muft be rediffolved in water. This, as before, muft be decompofed by acetat of lead; and the fame means reforted to, to collect the free acid.

Malic acid, obtained by any of thefe methods, is a brownifh-red liquid of a pungent and very four tafte. It is incapable of cryftallization, and prefents thus a particular diftinction from the other vegetable acids. When evaporated, it becomes thick and vifcid; and if expofed in thin layers to an atmofphere tolerably free from moifture, it dries, forming a brilliant varnifh. By heat it is eafily decompofed, becoming firft of a deep colour, and exhaling a thick and pungent vapour. The coaly matter which it leaves behind is very light and fpungy, fimilar to that yielded by mucilage of fugar. The volatile products, when collected in clofe veffels, are, according to Fourcroy, (Syftem vii. 270.) an acid water, much carbonic acid, and fome carburetted hydrogen. The malic acid is liable to fpontaneous decompofition, when long kept in a fluid ftate. All the powerful acids act upon it, and change its nature. By the fulphuric it is reduced to coal, and nitric acid changes it into the oxalic; a proof of the latter containing the greateft proportion of oxygen. Malic acid unites with different bafes, and forms a clafs of falts denominated *malats*. Thefe have been but little examined, except by their difcoverer Scheele. The malats of potafh, foda, and of ammonia are very foluble and deliquefcent. The neutral malat of lime exifts in the form of irregular cryftals, which are difficult of folution, even at a high temperature. The prefence of a flight excefs of acid, however, forms a fuper-malat, which is very readily diffolved. It is this compound which is contained in the common houfe leek. Malic acid, on being added to barytic water, caufes an immediate precipitation; but no fuch effect occurs with ftrontian. The latter falt, therefore, we may infer, is confiderably more foluble than the former. Of its combination with the other earths, but little more is known, than that with magnefia it forms a compound which is deliquefcent; while its product with alumine is very difficult of folution. It unites with fome metallic oxyds; and precipitates mercury, lead, and filver from the nitrats of thofe metals. In this latter refpect, it exhibits a ftriking difference from the citric acid, with which it is almoft always more or lefs mixed in vegetables; that fubftance caufing no change in the folutions juft mentioned. (See Citric *acid*.) Malic acid diffolves iron and zinc; the former of which yields a brown mixture incapable of cryftallization; but the latter falt may be obtained in fine regular cryftals. It decompofes muriat of gold, the oxyd being reduced to the metallic ftate. This acid is not applied to any ufeful purpofe.

MALICANDURGAM, in *Geography*, a town of Hindooftan, in Myfore; 19 miles N. of Allumbaddy.

MALICE, in *Ethics* and *Law*, is a formed defign of doing mifchief to another; it differs from hatred. In murder it is malice makes the crime; and if a man, having a malicious intent to kill another, in the execution of his malice kills a perfon not intended, the malice fhould be connected to his perfon, and he fhall be adjudged a murderer. The words *ex malitia præcogitata* are neceffary to an indictment of murder, &c. And this *malitia præcogitata*, or *malice prepenfe*, may be either *exprefs* or *implied* in law. *Exprefs* malice is, when one with a fedate, deliberate mind, and formed defign, kills another; which formed defign is evidenced by external circumftances, difcovering that intention; as lying in wait, antecedent menaces, former grudges, and concerted fchemes to do him fome bodily harm. (1 Hal. P. C. 451.) Befides, where no malice is expreffed, the law will imply it; as where a man wilfully poifons another; in fuch a deliberate act the law prefumes malice, though no particular enmity can be proved And if a man kills another fuddenly, without any, or without a confiderable provocation, the law implies malice; for no perfon, unlefs of an abandoned heart, would be guilty of fuch an act, upon a flight or no apparent caufe. See Murder.

MALI-CHAN, in *Geography*, a fmall ifland near the coaft of China, in Quang-tong; 10 miles S.W. of Macao.

MALICHO, a town on the S. coaft of the ifland of Mindanao. N. lat. 7° 48′. E. long. 124° 21′.

MALICIOUS Mischief, in *Law*. See Mischief.

Malicious *Profecution*. See Injury.

MALICORNE, in *Geography*, a town of France, in the department of the Sarthe, and chief place of a canton, in the diftrict of La Flêche; fix miles N. of La Flêche. The place contains 1023, and the canton 10,226 inhabitants, on a territory of 225 kiliometres, in 11 communes.

MALICOY, a low fmall ifland in the Indian ocean, between the Laccadive and Maldive iflands, furrounded with breakers, and dependent on a rajah of the Malabar coaft. N. lat. 8° 16′ 30″. E. long. 73° 9′ 30″.

MALICURGINAGUR, a town of Hindooftan, in Myfore; 50 miles S. of Seringapatam.

MALIDIA, a town of Africa, on the E. coaft of Tunis; 110 miles S.S.E. of Tunis.

MALIGHERY, a town of Hindooftan, in Baramaul; 30 miles S.E. of Darempoory.

MALIGNANT, in *Medicine*, that quality in a difeafe which renders it more than ordinarily dangerous, and difficult of cure.

Malignant

Malignant is generally applied to ſuch fevers as are epidemical or infectious, and are attended with ſpots and eruptions of various kinds. See *Malignant* Fever.

MALIKERY, in *Geography*, a town of Hindooſtan, in Myſore; 18 miles N. of Seringapatam.

MALIKUL, a lake of Ruſſia. N. lat. 48° 20′. E. long. 60° 14′.

MALILLA, a town of Sweden, in the province of Smaland; 45 miles N.N.W. of Calmar.

MALINES, or Mechlin, a city of France, and principal place of a diſtrict, in the department of the Two Nethes; lately the capital of a province of the Netherlands, comprehending a ſmall territory with about nine towns and villages. It was the ſee of an archbiſhop, and contains ſix pariſh churches. The number of inhabitants in the town is eſtimated at 16,612, and in the two cantons at 24,640, in a territory of 87½ kiliometres, in nine communes. The manufactures of the place, which are conſiderable, are thoſe of bed-quilts, thread, and particularly lace, which is in high eſtimation all over Europe. In the arſenal is a foundery for cannon, and other inſtruments of war. The town is diſtant 12 miles N. from Bruſſels. N. lat. 51° 1′ 50″. E. long. 4° 28′ 45″.

MALINHEAD, the moſt northern cape of Ireland, in the diſtrict of Iniſhowen and county of Donegal. N. lat. 55° 23′. W. long. 7° 16′.

MALINOV, an iſland in the mouth of the Volga, at its entrance into the Caſpian ſea. N. lat. 45° 8′.

MALISTA, one of the ſmall Weſtern iſlands, near the W. coaſt of Lewis. N. lat. 58°. W. long. 7° 4′.

MALIT, a town on the N. coaſt of the iſland of Timor. S. lat. 8° 24′. E. long. 125° 55′.

MALIVAGONGA, a large river of Ceylon, in the country of Candy, which riſes at the foot of Adam's peak, a high mountain S.W. of Candy, and taking a N.E. direction, nearly ſurrounds the capital, and at length falls into the ſea at Trincomalee.

MALIUTO, a town of Naples, in Calabria Citra; 12 miles N.W. of Biſignano.

MALKAR, a town of Hindooſtan, in the country of Golconda; 54 miles W. of Hydrabad. N. lat. 17° 17′. E. long. 77° 53′.

MALKARABÆLA, in *Zoology*, the name of an Eaſt Indian ſpecies of ſerpent found in the iſland of Ceylon. It is remarkably variegated with white and duſky brown, in various figures.

MALKUITZ, in *Geography*, a town of Sileſia, in the principality of Breſlau; nine miles S.W. of Breſlau.

MALL, or Mallet, a ſmaller kind of mace, a weapon uſed by our ancient Engliſh archers for diſpatching the enemies whom they had wounded with their arrows.

Mall, or *Sea-mall*, in *Ornithology*, the Engliſh name of the Larus *Canus;* which ſee.

MALLA, in *Geography*, a town of Africa, in the country of Woolly; 15 miles E. of Medina.

MALLABAUQUEN, a lake of Chili; 60 miles N.E. of Valdivia.

MALLAMA, a town of South America, in Popayan; 30 miles S.W. of Paſto.

MALLANCY Choky, a town of Aſſam; 50 miles E. of Rangamatty.

MALLAPILLY, a town of Hindooſtan, in Myſore; 12 miles N. of Venchatighery.

MALLARD, the *Anas Boſches*, in *Ornithology*. See Duck.

MALLAWALLE, in *Geography*, a ſmall iſland in the Eaſt Indian ſea, N. of Borneo. N. lat. 7° 2′. E. long. 117° 29′.

MALLEABILITY, in *Phyſics*, a property principally confined to ſome of the metals, by which their form can be changed by the action of the hammer. When the change of figure is effected by rollers, the ſubſtance is ſaid to be *laminable:* when by wire drawing, it is called *ductility*. The property, however, is the ſame in all theſe proceſſes. Some bodies are malleable only at a certain temperature, ſuch as glaſs, and ſome of the metals: others at all temperatures, to a certain degree. This is the caſe with moſt of the malleable metals.

Some bodies are not malleable till they have received a certain mechanical treatment. In ſuch caſes, it is obſerved, that when the body is brittle, it is under its cryſtalline form, or that ſtate in which its fracture exhibits ſome regular figures. This is the caſe with iron and zinc. See Metal and Zinc.

MALLEABLE, ſomething hard and ductile, and that may be beaten, forged, and extended under the hammer, without breaking.

All metals are malleable, not excepting even quickſilver; but gold is ſo in the greateſt degree of all. The chemiſts have long ſought the fixation of mercury, or to render it malleable. See Mercury, and Freezing.

MALLEAM, in *Geography*, a town of Hindooſtan, in the Carnatic; 24 miles S.S.W. of Tritchinopoly.

MALLEAMOTHE, in *Botany*, a low tree, or rather ſhrub, growing in Malabar. Of the roots are made hafts for knives, the leaves ſerve to dreſs the ground, and being fried in oil of palm, furniſh a liniment for removing the impetigo, and drying the puſtules of the ſmall-pox. A decoction of the ſame, in common water, is uſed as a fomentation to mitigate the pains of the hæmorrhoids.

The root pulverized with ginger and ſaffron, and exhibited in an infuſion of rice, cures the dropſy by powerfully promoting a diſcharge of ſuperfluous ſeroſities by the urinary paſſage. Acoſta commends the ſhrub principally for two effects; firſt, againſt fluxes of the belly, for which purpoſe, however, it is of leſs efficacy than other medicines; ſecondly, for curing all kinds of eryſipelas, eſpecially ſuch as proceed from mere bile. They macerate the whole root or trunk, bruiſed in a decoction of rice, and ſuffer them to remain there for ſome hours, that the water may contract an acidity; after which they anoint the eryſipelas with it, and order the patient to drink a ſufficient quantity of the ſame twice a-day, the ſtomach being firſt purged. They give the ſame water to thoſe who labour under an inflammation of the liver, and the burning heat of a fever; and uſe it mixed with a ſmall quantity of the juice of the leaves of tamarind, to anoint the lips of the wounds, in order to prevent an inflammation.

MALLEI Externus, in *Anatomy*, the name given by Albinus and others to a muſcle of the malleus, ſometimes called laxator tympani. See Ear.

Mallei *Internus*, the name under which Winſlow and others have deſcribed the tenſor tympani muſcle. See Ear.

Mallei *Superior*, is the muſcle deſcribed by Albinus as the laxator tympani, and by ſome others as the laxator tympani minor. See Ear.

MALLEMANS, Claude, in *Biography*, deſcended from a noble family, was born at Beaune, in Burgundy, about

about the year 1646. He came to Paris while he was very young, where he purfued his early ftudies, and, in 1664, he entered among the priefts of the congregation of the Oratory, and afterwards attached himfelf to the univerfity of Paris. Here he fulfilled the duties of profeffor of philofophy for more than thirty years with great reputation, and had the honour of giving inftructions in this fcience to the duchefs of Burgundy. He died in 1723, at the advanced age of feventy-feven, and in circumftances of diftrefs and great poverty. He poffeffed a very inventive genius, and was a zealous advocate for the philofophy of Des Cartes. He invented a machine for making all forts of dials, and was author of "A Phyfical Treatife on the World;" "A new Syftem of the Load-ftone;" an attempt to folve "The famous Problem of the Quadrature of the Circle;" he publifhed many papers in the "Journaux des Sçavans," between the years 1674 and 1716. Moreri.

MALLE-MUCKE, in *Ornithology*. See FULMAR and PROCELLARIA *Glacialis*.

MALLENOWITZ, in *Geography*, a town of Moravia, in the circle of Hradifch; 10 miles N.E. of Hradifch.

MALLEOLARIS, in *Anatomy*, *malleolar*, an epithet applied to two fmall branches of the anterior tibial artery, diftributed on the ankle joint. They are diftinguifhed as external and internal. (See ARTERY.) The term is fometimes ufed in fpeaking of a procefs of the tibia, and one of the fibula. See MALLEOLUS.

MALLEOLI, among the *Romans*, bundles of any combuftible matter befmeared with pitch, and ufed by the Roman foldiers either for giving light in the night-time, or for fetting fire to fome of the enemies' works.

The malleoli were fometimes fixed to a dart or javelin, that they might be fure to catch firm hold, and communicate the fire wherever they happened to light.

MALLEOLUS, in *Anatomy*, a technical term equivalent to ankle. It denotes the bony prominences, which protect the joint of the ankle. The inner and fmaller of thefe (*malleolus internus*) is a procefs of the tibia; the outer and larger (*malleolus externus*) is a part of the fibula. See EXTREMITIES.

MALLEOLUS, in *Ichthyology*, a name given by Gaza and fome others, to the fifh called by Ariftotle and the other old writers, fphyræna, and by the Italians luzzo marino.

It is a beautiful fifh, and feems to belong to the fcombri, or mackarel kind. Salvian has figured it under the name of fudis, a name by which it is alfo called by Varro and fome other old authors; but Salvian's figure is very imperfect; he has omitted the back-fin.

MALLEPALEAM, in *Geography*, a town of Hindooftan, in Myfore; nine miles S. of Sankeridergam.

MALLESUNDRUM, a town of Hindooftan, in Myfore; 10 miles E. of Sankeridergam.

MALLET, DAVID, in *Biography*, a poet and mifcellaneous writer, a native of Scotland, was probably born in Perthfhire. The name of his family was Malloch: little is known of him in early life, but in 1720 he was tutor to the children of a Mr. Home, near Edinburgh, and at the fame time attended lectures in the univerfity of that city. He had already diftinguifhed himfelf by fome poetical compofitions, particularly by a paftoral, which brought him into notice among the Scottifh literati. The treatment which he met with at Mr. Home's did not accord with his expectations, and in 1723, he gladly accepted the offer of accompanying the two younger fons of the duke of Montrofe to Winchefter. About this time he printed in the "Plain-Dealer" his admired ballad of "William and Margaret;" its fuccefs induced him to refume his poetical ftudies, and in 1728 he publifhed "The Excurfion." About this time he changed his name from Malloch to Mallet, and in 1731 his tragedy of "Eurydice," which had been planned fome years before, was brought on the ftage, and was favourably received. He had now attained to a fufficient degree of confequence to be admitted to the company of men of rank and literary eminence; among thefe was Pope, whofe ridicule of critics and commentators he echoed, in a poem publifhed in 1733, "On Verbal Criticifm." Immediately after this, the prince of Wales appointed him his fecretary, with a falary of two hundred pounds a-year. In 1734, he attended the prince of Orange on a vifit to Oxford, and prefented to him a copy of verfes written in the name of the univerfity, on which occafion he was admitted to the degree of M.A. His tragedy of "Muftapha" was brought on the ftage in the year 1739, and met with fome degree of temporary fuccefs. The longeft poem of this author is entitled "Amyntor and Theodora;" it is a pathetic tale in blank verfe, interfperfed with much poetical defcription, but it is generally deemed tedious. Among the profe pieces of Mallet, the moft important was "The Life of Lord Bacon," prefixed to an edition of his works, which appeared in 1740; this, though an elegant and judicious article of biography, is defective in the difplay of what conftitutes the main point of that wonderful man's merit, his character as a luminary of fcience. After the death of Pope, lord Bolingbroke employed Mallet to blacken his memory, in revenge for clandeftinely printing his "Patriot King." In reward for this fervice, his lordfhip left him his works, which in 1754 he publifhed in five volumes quarto, but which not only involved him in difficulties, on account of certain fentiments contained in them fubverfive of the principles of revealed religion, but which did not produce to the editor any profit. After this he was engaged to write the life of the great duke of Marlborough, for which he was liberally paid, with an annual penfion, though it is pretty well afcertained that he never made any progrefs in the bufinefs. He was next employed by the miniftry to attack admiral Byng, with the view, no doubt, of diverting the public odium from the real delinquents, and to throw it on the unfortunate commander. Byng was executed, and Mallet rewarded with a confiderable penfion. He died in 1765; he is defcribed as a man of agreeable manners and converfation, fufficiently attentive to his own intereft, but ready to ferve his friends. "Nothing," fays his biographer, "elevated or dignified can be difcerned in his character or principles. As a poet he may lay claim to elegant diction, fplendid imagery, and pathetic fentiment, but he is deficient in energy and judgment." Johnfon's Lives of the Poets.

MALLET, EDME, was born at Melun in the year 1713; and in 1751 we find him engaged in ferving a *cure* near his native place, when he came to Paris, and was chofen profeffor of theology in the college of Navarre. He made himfelf known by various publications, of which the following were the principal; "Principes pour la Lecture des Poetès;" "Effai fur l'Etude des Belles Lettres;" "Effai fur les Bienfeances Oratoires;" "Principe pour la Lecture des Orateurs;" "A Tranflation of Davila's Hiftory of the Civil Wars of France." He engaged to furnifh the articles of theology, and the belles lettres for the Encyclopédie. His ftyle in all his works is neat, clear, and unaffected. In his feveral treatifes on poetry and polite literature, he limited himfelf to an accurate expofition of the precepts laid down by the beft mafters, illuftrated by felect examples. As a man and a friend, a friend, he was an object of esteem to all who knew him, on account of his mildness, moderation, and candour.

Mallet, James Andrew, a professor at Geneva, descended from a good family in that city, was born in 1740; he was destined for a military life, but was prevented from pursuing it by an accident in his youth, by which the muscles of his legs became contracted, and he continued lame through the whole of his life. He was educated in the public school of Geneva, and displayed an early attachment to the mathematics. From Geneva he went to Basil, and studied with great success under the celebrated David Bernouilli. In 1764 he obtained a prize from the academy of Lyons for the best answer to a mathematical prize question, and in the following year he made a tour to France and England, in the course of which he formed an acquaintance with Lalande at Paris, and the late Dr. Maskelyne, at London, and the taste which M. Mallet acquired for astronomy, was no doubt a consequence of his intimacy with these eminent men. In this science he was greatly assisted by his profound knowledge of the mathematics, in which he was continually exercising his genius and talents. He wrote two papers on the calculation of chances, which were inserted in the "Acta Helvetica;" and at the request of Lalande, he calculated a table of the aberration and nutation of the stars of the first and second magnitude, which was published in the "Connoissance des Temps," and afterwards in Lalande's great work on astronomy. On his return, he lived some time in the bosom of his family, till he was appointed by the academy of Petersburgh, by the recommendation of Lalande and Bernouilli, to observe the transit of Venus in 1769, at one of the northern stations made choice of for that purpose. He was accompanied by M. J. L. Pictet, but the object of their mission was in a great measure lost by the unfavourableness of the weather. On his return, he formed an intimate acquaintance with J. A. Pictet of Geneva, who assisted him in his astronomical observations, with instruments which Mallet had procured at his own expence from England. In 1777 he was elected a member of the commission appointed to draw up a plan for settling the disputes by which the harmony of the little republic had for fifteen years been disturbed, and which were at length silenced for some time, by the intervention of foreign powers. Though Mallet was not at all ambitious of literary fame, he was honoured with unsolicited marks of distinction by several foreign societies. He was one of the members of the Academy of Sciences at Paris, and some of his best astronomical observations may be found in the memoirs of that learned society. He maintained an epistolary correspondence with the most learned astronomers in Europe; and at his country house, where he spent the greater part of his time, he employed himself in making astronomical observations, and in conversing with the neighbouring farmers on subjects of rural economy. While at Geneva, he led a retired life, but had a weekly meeting of literary friends at his house, and attended the sittings of the Society for the Encouragement of Arts. He was visited by many foreigners of distinction, and was universally esteemed for his talents, integrity, and benevolence. He died in the year 1790, of an apoplexy. Gen. Biog.

Mallet, a large kind of hammer, made of wood; much used by artificers who work with a chissel, as sculptors, masons, and stone-cutters, whose mallet is ordinarily round; and by carpenters, joiners, &c. who use it square. See Hammer.

There are several sorts of mallets used for different purposes on ship-board. The *caulking-mallet* is chiefly employed to drive the oakum into the seams of a ship, where the edges of the planks are joined to each other in the sides, deck, or bottom. The head of this mallet is long and cylindrical, being hooped with iron to prevent it from splitting in the exercise of caulking. There is also the *serving-mallet*, used in serving the rigging, by binding the spun-yarn more firmly about it than it possibly could be done by hand; which is performed in the following manner; the spun-yarn being previously rolled up in a large ball, or clue, two or three turns of it are passed about the rope, and about the body of the mallet, which, for this purpose, is furnished with a round channel in its surface, that conforms to the convexity of the rope intended to be served. The turns of the spun-yarn being strained round the mallet, so as to confine it firmly to the rope, which is extended above the deck, one man passes the ball continually about the rope, whilst the other, at the same time, winds on the spun-yarn by means of the mallet, whose handle, acting as a lever, strains every turn about the rope as firm as possible. Falconer.

Mallet, *Maule*, or *Mall*, in *Military Language*, a weapon formerly used both by the English and Scots. In the memorable combat fought in Bretagne, in the year 1315, between thirty champions on the part of the English, and the like number on that of the French, one of the English champions, named Billefort, was armed with a leaden mallet weighing twenty-five pounds. We learn also from father Daniel, that the English archers still used mallets in the time of Louis XII., who began his reign in 1515, and died in 1524. In the ancient poem of the battle of Flodden, the mention of leaden mallets often occurs; and from the following description there given of it, it seems as if the head of the mall was entirely of lead, hooped round at the ends with iron:

"Some made a mall of massy lead,
Which iron all about did bind."

Ralph Smith equips an archer with a maule of lead, five feet long, and a pike with the same, hanging by a girdle with a hook; meaning, probably, by this description, that the handle of the mall should be of this length, the end armed with a pike or spike; and this implement, we may imagine, was worn at the back, hung by a hook fixed in the centre of its handle, with a loop, or some other contrivance, to keep it nearly perpendicular. Father Daniel has engraved one of these mallets, which, in form, exactly resembles the present wooden instrument of that name, except that its handle is somewhat longer. This weapon seems to have been of French extraction; for we find, that in the reign of Charles VI., on occasion of a riot, the populace forced open the arsenal, and armed themselves chiefly with mallets, whence they were styled "Mailliotins." Mallets were tremendous weapons in the hands of strong active men, such as are described to have wielded them in the following verses:

"Two Scotch earls of an ancient race,
One Crawford called, the other Montrose,
Who led twelve thousand Scotchmen strong,
Who manfully met with their foes
With leaden malls and lances long."

"Then on the English part with speed
The bills stept forth, and bows went back;
The Moorish pikes and malls of lead
Did deal there many a dreadful thwack."

Grose's Mil. Ant. vol. i.

MALLETAR, in *Geography*, a town of Hindoostan; 60 miles E.S.E. of Cochin.

MALLEUS, in *Anatomy*, one of the ſmall bones contained in the cavity of the tympanum. See Ear.

MALLI, in *Ancient Geography*, the inhabitants of the country now called *Moultan*, which ſee. Their capital was ſituated not far from the river Rauvee (anciently Hydraotes), ſomewhat below the preſent town of Toulumba, which is a famous paſs on the Rauvee, between Lahore and Moultan.

MALLICOLLO, or Manicola, in *Geography*, one of the New Hebrides, which, to the S.E., extends N.W. and S.E., and in that direction is eighteen leagues long. Its greateſt breadth, which is at the S.E. end, is eight leagues, the N.W. end is two-thirds this breadth, and nearer the middle one-third; a contraction which is occaſioned by a wide and pretty deep bay on the S.W. ſide. Captain Cook repreſents it as fertile and well inhabited: the land on the ſea-coaſt is rather low, and lies with a gentle ſlope from the hills which are in the middle of the iſland. The inhabitants, forming what Cook denominates an ape-like nation, are deſcribed as the moſt ugly ill-proportioned people he ever ſaw, and different from any met with in this ſea. They are a very dark-coloured and diminutive race; with long heads, flat faces, and monkey countenances. Their hair, moſtly black or brown, is ſhort and curly; but not quite ſo ſoft and woolly as that of a negro. Their beards are very ſtrong, criſp, and buſhy, and generally black and ſhort. But what moſt adds to their deformity is a belt, or cord, which they wear round their waiſt, and tie ſo tight over the belly, that the ſhape of their bodies is not unlike that of an overgrown piſmire. The men go quite naked, except a piece of cloth, or leaf, uſed as a wrapper. Few women were ſeen, but they were not leſs ugly than the men; their heads, faces, and ſhoulders are painted red; they wear a kind of petticoat; and ſome of them had ſomething over their ſhoulders like a bag, in which they carry their children. Their ornaments are ear-rings made of tortoiſe-ſhell, and bracelets, wrought with thread or cord, and ſtudded with ſhells, worn juſt above the elbow. Round the right wriſt they wear hogs' tuſks, bent circular, and rings made of ſhells, and round their left a round piece of wood, deſigned probably to ward off the bow-ſtring. The bridge of the noſe is pierced, in which they wear a piece of white ſtone, about 1½ inch long, and of a curved form. As ſigns of friendſhip, they preſent a green branch, and ſprinkle water with the hand over the head. Their weapons are clubs and ſpears made of hard and iron-wood, and bows and arrows. The bows are four feet long, made of a ſtick ſplit down the middle, and partly circular; the arrows are a ſort of reeds, ſometimes armed with a long ſharp point of bone, and the points were covered with a ſubſtance found to be poiſon. Their arrows they carefully preſerve in a quiver; and ſome of them are armed with two or three points, each with ſmall prickles on the edges, to prevent the arrow from being drawn out of the wound. Their language is different from that of any other nation: the letter R often occurs in their words; and they expreſs their admiration by hiſſing like a gooſe. Their houſes are like thoſe of the other iſles, low, and covered with palm thatch. Their fruits, ſuch as the bread-fruit, plaintains, and cocoa-nut trees, are not ſo good as thoſe of the Society or Friendly Iſles; but their yams appeared to be very good. Their animals are pigs and fowl; they have not ſo much as a name for a dog, and conſequently they have none. Pieces of cloth, and marbled paper, were articles which they moſt eſteemed; but edge tools, nails, and beads, they ſeemed to diſregard.

The harbour, viſited by captain Cook, is ſituated on the N.E. ſide of Mallicollo, not far from the S.E., and in S. lat. 16 25′ 20″. E. long. 167 57′ 23″, and was called by him Port Sandwich. It lies in S.W. by S. about one league, and is one-third of a league broad. A reef of rocks extends out a little way from each point; but the channel is of a good breadth, and has in it from forty to twenty-four fathoms of water. In the port the depth of water is from twenty to four fathoms; and it is ſo ſheltered, that no winds can diſturb a ſhip at anchor there. Another great advantage is, that you can lie ſo near the ſhore, as to cover your people, who may be at work upon it. Two reddiſh fiſh, reſembling a large bream, and of the ſame ſize, were caught in the harbour, which appeared, by their effects on thoſe who partook of them, to be poiſonous. This ſort of fiſh is mentioned by Quiros under the name of pargos. Cook's Second Voyage, vol. ii. See *New* Hebrides.

MALLING, West, or *Town Malling*, a market-town and pariſh in the hundred of Larkfield, lathe of Aylesford, and county of Kent, England, is ſituated ſix miles diſtant from Maidſtone, and thirty from London. The manor was given, ſays Lambard, "to Burbicus, biſhop of Rocheſter, by king Edmund, the brother of Athelſtane, under the name of Three Plough-lands in Mealinges." After a temporary alienation, it was reſtored to the biſhops of this ſee, previouſly to the Domeſday Survey, at which time "here were a church and a mill." In the year 1090, biſhop Gundulph founded a Benedictine nunnery here, and endowed it with the manor, church, and other eſtates: he governed it in perſon during his life, but directed that in future it ſhould be under the juriſdiction of an abbeſs, ſubordinate to the biſhops of Rocheſter. In 1190, the abbey, as it was then called, and the village, ſuffered by fire, but were ſoon reſtored: in the time of king John, the abbeſs had a grant of free-warren for all her demeſne; and Henry III. added the privilege of a weekly market, and three annual fairs. After the diſſolution, the manor and abbey-buildings were exchanged with archbiſhop Cranmer, and have ſince paſſed through various families to the Honeywoods. The late Filmer Honeywood, eſq. pulled down the abbey-houſe, and with the materials erected the preſent manſion, preſerving, as much as poſſible, the ancient ſtyle and form. It is now the reſidence of George Talbot Hatley Foote, eſq. Many parts of the conventual pile are, however, yet ſtanding, being uſed as offices, together with a portion of the weſt end of the abbey-church, which is an intereſting remain of Norman architecture, and is ornamented with ſculptures of heads, animals, and interſecting arches. The abbey grounds are watered by a clear ſtream, which flows from Nether-Well, in the hamlet of St. Leonard's; where is yet ſtanding the ruined tower of St. Leonard's chapel, a very ſtrong remain, much reſembling the keep of a Norman caſtle: its preſent height is ſeventy-one feet; the walls are ſeven feet in thickneſs.

The town of Weſt Malling conſiſts principally of one ſpacious ſtreet, well built, and about half a mile in length, together with ſeveral detached manſions belonging to reſpectable families. The pariſh-church is a large fabric, conſiſting of a nave and chancel, with a Norman tower: the nave has been moſtly rebuilt ſince the year 1778, when the whole roof fell in, through the decay of the main columns. Here are ſome ancient and curious braſſes. A ſmall free-ſchool was built in 1632, by a bequeſt of Mr. Francis Treſſe. The population return in the year 1801, ſtated the inhabitants of Weſt Malling to be 1093, occupying 192 houſes.

In Eaſt Malling, a village about a mile diſtant, is Bradbourne, the ſeat of ſir John Papillon Twyſden, bart., which, though not particularly extenſive, forms one of the moſt delightful reſidences in Kent. Some good portraits of the learned

learned judge Twyfden, who died here in 1666, are preferved in Bradbourne-houfe. Hafted's Hiftory and Topographical Survey of Kent, twelve vols. 8vo. Beauties of England and Wales, vol. vii.

MALLOCOCCA, in *Botany*, fo called by Forfter and in the Upfal Tranfactions, is a fpecies of GREWIA. See that article.

MALLOTUS, according to Loureiro, was fo named from μαλλωτος, *hairy*, the capfule of this plant being profufely and remarkab y befet with hairs. Loureir. Cochinch. v. 2. 635.—Clafs and order, *Diœcia Polyandria*. Nat. Ord. *Tricoccæ*, Linn. *Euphorbiæ*, Juff.

Gen. Ch. Male, *Cal.* Perianth inferior, of three roundifh, concave, woolly leaves. *Cor.* none. *Stam.* Filaments numerous, fhort, inferted into the receptacle; anthers two-lobed, roundifh.—Female, *Cal.* Perianth of three triangular, equilateral, hairy, expanded leaves. *Cor.* none. *Pift.* Germen fuperior, roundifh, three-lobed; ftyle none; ftigmas three, oblong, hairy, coloured, reflexed. *Peric.* Capfule roundifh, of three lobes, fix valves, and three cells, fingle-feeded, covered with a multiplicity of long and foft hairs. *Seeds* roundifh on one fide, angular on the other, remaining on their proper ftalks upon the receptacle, after the capfule has fallen away.

Eff. Ch. Male, Calyx of three leaves. Corolla none. Stamens numerous.—Female, Calyx of three leaves, inferior. Corolla none. Stigmas three. Capfule three-celled. Seeds folitary, ftalked.

Obf. Loureiro remarks, that this genus is nearly related to *Cliffortia*, but that it differs in having the capfule fuperior and three-celled, as well as in having three feffile ftigmas.

1. M. *Cochinchinenfis*. Cây. Bèt. of the natives. Loureir. —Found about hedges and neglected gardens, in Cochinchina and China.—The only fpecies known.—This *tree* is of middling height, with fpreading *branches*. *Leaves* alternate, roundifh, generally three-lobed, a few however are undivided, ovate, pointed, all of them ftand on footftalks, are toothed and downy. *Flowers* reflexed, in loofe clufters, ending in a fpike.

Loureiro found the Male Flowers of *Mallotus* occafionally to vary, in having their calyx-leaves lanceolate, hairy, and fpreading. Filaments upwards of forty, fhorter than the calyx; anthers ovate, erect.—He met with this variety growing near Canton, but could find no female flowers in that neighbourhood.

MALLOW, in *Botany*, &c. See MALVA.

MALLOW, *Baftard*. See MALOPE.

MALLOW, *Jews'*. See CORCHORUS.

MALLOW, *Indian*, See URENA.

MALLOW, *Indian*, or *Yellow*. See SIDA.

MALLOW, *Rofe*. See ALCEA.

MALLOW, *Sea*, *Malva marina*, in *Natural Hiftory*, a name not very judicioufly given by fome writers to a fpecies of fubmarine fubftance, fuppofed in fome degree to refemble the leaves of the common mallow. It is very common in the places where they fifh for coral, and grows to the rocks without any regular root; it is found at different depths, but moft ufually far from the furface, and its height is ufually about two inches; it is of a dufky greenifh colour, with an admixture of faint yellow; it is compofed of feveral leaves about half an inch broad, and a little more than that in length: each of thefe is faftened to a pedicle of about an inch and a half long; the leaves are of a fine thin membranaceous fubftance, but their ftalks or pedicles are thick and rough like horn. When examined by the microfcope many glandules difcover themfelves upon the furfaces of the leaves, but the ftalks or pedicles are entirely covered with glandules in form of fmall protuberances, which make it as rough in thofe parts as the common fhagreen. The ftalks when cut tranfverfely fhew an infinite number of pipes or veffels running up to every part of the leaves. Count Marfigli has given an elegant figure of this, both as it appears to the naked eye, and by the microfcope.

MALLOW, *Syrian*, in *Botany*. See HIBISCUS.

MALLOW, *Tree*, *varied-leaved*, or *Venetian*. See LAVATERA.

MALLOW, *Vervain*, a fpecies of the *malva*, or common mallow. Some have called the *alcea* by this name.

MALLOW, *Yellow*. See SIDA.

MALLOW, in *Geography*, a poft-town of the county of Cork, Ireland, fituated on the river Blackwater, over which it has a ftone bridge. It is much frequented on account of a foft and tepid fpring (difcovered in 1724), of the fame nature and efficacy as the Hot-wells of Briftol. Mallow was incorporated in 1688, and is governed by a provoft and burgeffes; and it fends a member to parliament. It is 117 miles S.W. from Dublin, and 15 N. by W. from Cork. A tract of country on each fide of the river conftitutes the liberties of Mallow, and is inhabited by feveral refpectable families.

MALM, in *Agriculture*, a term fometimes applied to a fort of white marley clay. It is a fubftance that has been found beneficial on foils of the ftiff clayey kind when laid on in pretty large proportions, as about fixty tons *per* acre. In one inftance of this kind of foil, mentioned in the fourth volume of Communications to the Board of Agriculture, when applied in this proportion on a very large fcale, the produce was full three times as great *per* acre, as in the original ftate. It is afferted that the quality of this fubftance may be beft proved by common vinegar; in which cafe a portion fhould be dried, and put into a wine glafs full of vinegar; when, if it inftantly begins to effervefce and attract the acid, it may be depended on to be highly ufeful as a manure. It may be ufed in other cafes alfo with great benefit.

MALMEDY, in *Geography*, a town of France, and principal place of a diftrict, in the department of the Ourte; 23 miles E.S.E. of Liege. The place contains 4344, and the canton 12,007 inhabitants, on a territory of 232½ kiliometres, in fix communes. This town has fome mineral fprings, which are reckoned equal, if not fuperior, to thofe of Spa. Its principal manufacturers are employed in making cloth and dreffing of cotton. The town was taken by the French in October, 1794. N. lat. 51° 24'. E. long. 6° 7'.

MALMESBURY, a borough, market-town, and parifh in the northern part of Wiltfhire, England, is a place of note in the monaftic annals of the country, and ftill retains fome interefting remains of its ancient fplendour. Its early hiftory is involved in doubt, and is fo blended with the romances of monachifm and fuperftition, that it is difficult to feparate the facts from the fables of old chronicles. Leland ftates that a caftle was built here four or five centuries before the Chriftian era. Other writers fay that Dunwallo-Malmutius, king of the Britons, gave it the appellation of Caer Bladon, and that it was afterwards fucceffively denominated Ingleburne, Maildulfburgh, Aldelmfbirig, and Meildunum.

The hiftory of this town is intimately connected with the hiftory of its religious eftablifhents. A convent of Britifh nuns, under the direction of Dinoth, is faid to have been fettled here towards the clofe of the fixth century, but its inhabitants being accufed of living in a ftate of incontinency with

with the soldiers in the castle, it was suppressed by Augustin, the first archbishop of Canterbury. About this time Medolph, a Scot, remarkable for his piety and strict holiness of life, who had left his own country on account of persecution, fixed his residence here, and established a school for his support. Having collected a number of persons disposed to embrace a monastic life, he built a small monastery, which was shortly afterwards received under episcopal jurisdiction. The town, at this period, seems to have been a place of considerable importance, but no records in its secular history are extant prior to the year 878, when it appears to have been attacked and burned by the Danes. It afterwards suffered again by fire in the reign of Edward the Elder, who constituted it a borough by charter, so that it is amongst the most ancient corporations in the kingdom. In the time of his successor Athelstan, two battles appear to have been fought in this neighbourhood, with the piratical invaders, already mentioned, in which the men of Malmesbury displayed great valour, and in consequence received a confirmation of their charter, with additional privileges. The place was subsequently the theatre of the contest, which king Stephen had to maintain against his turbulent barons, as well as against his competitor Henry of Anjou. The latter prince having laid siege to, and took it in a very short time, together with the castle, except one tower, which finding too strong to be taken by assault, he blocked it up with the view of reducing it by famine, and notwithstanding the vigorous attempts of Stephen to produce its relief, ultimately effected his object. After this period nothing worthy of notice occurs in the history of Malmesbury, till the era of the civil wars in the reign of Charles I. when it was several times besieged and taken both by the republicans and royalists.

This town is built on a commanding eminence, peninsulated by two streams which unite to form the lower Avon. According to the parliamentary returns of 1801, it then contained 207 houses, and 1027 inhabitants, of whom 83 were returned as employed in different branches of trade, but this must be erroneous. In former times it was much more extensive than at present, many of the streets described in old records being totally demolished. The principal manufacture carried on here is that of woollen cloth, for which it was famous at an early period, but a number of hands are employed in the leather trade, and in the manufacture of gloves, parchments, glue, &c. There is a weekly market on Saturdays, and one also on the last Tuesday of each month, called the great market. Besides the churches belonging to the establishment, there are four places of public worship appropriated to the meetings of dissenters. The only charitable institutions are two alms-houses, and two free schools.

It has been already mentioned that the original charter to this town was granted by Edward the Elder, and confirmed by his successor Athelstan. Charters of confirmation, with additional privileges, were likewise bestowed by several succeeding monarchs. The present one is dated in the reign of William III. and by virtue of it the government is vested in an alderman, a high steward, twelve capital burgesses, and twenty-four assistants. The alderman and high steward, or their deputies, are justices of the peace.

The other persons connected with the borough are styled landholders and commoners. In the latter charters the commoners are denominated free-burgesses, and constitute the lowest members of the corporation. The landholders occupy a situation between them and the assistant burgesses, and are entitled by their office to the possession of an acre of land for life. Two members have been sent by this borough to parliament, from the third year of the reign of Edward I. During the last century it was celebrated for its electioneering contests, the higher branches of the corporation claiming the exclusive privilege of voting at elections, while the lower members maintained their title to participate in the nomination of their representatives. The point, however, was finally decided by a committee of the house of commons in the year 1796, in favour of the alderman and twelve capital burgesses, who will, therefore, probably enjoy their privileges henceforth without opposition.

Malmesbury abounds with remains of antiquity, which sufficiently declare its former greatness. The most extensive and important of these is the abbey. By the donations and grants, both of princes and private individuals, this institution soon rose into great celebrity. The church was built in the form of a cross, and the whole buildings are said to have covered no less than forty-five acres of ground, including the garden and offices belonging to the monks. The church was a noble structure of great extent, and surmounted by two magnificent towers, one of which stood in the middle of the transept, and the other at the west end. This, as well as every other portion of the monastery, was built at different times, at least underwent such alterations and repairs as, no doubt, changed materially the original edifice. The western front is said by Brown Willis to have been an uncommonly fine piece of architecture, and richly adorned with sculpture. Over the entrance, on this side, was a very magnificent window filled with painted glass. About a fourth of the building only now remains. Both the towers are long ago levelled with the ground, that at the west end having been battered down during the civil wars, when, it is probable, the cloisters also were demolished, as no trace of them can be discovered above ground. Part of a mosaic pavement, however, was found a few years ago, in a garden to the north-west of the church which is supposed to have formed the floor of that portion of the monastery. The southern porch of this church is a truly curious and interesting specimen of ancient architecture. It consists of two distinct divisions; an exterior arch, or coved recess, with a series of archivolt mouldings, charged with a great variety of sculptured figures in basso-relievo: within this is a square apartment, or vestibule, on each side of which are large statues in basso-relievo, and over the door is another compartment, said to be meant to represent the Deity on a throne, supported by angels, and just within it is a head, supposed to represent our Saviour crowned with thorns. In the interior, the nave is divided from the side aisles by round columns, with plain capitals, above which are three rows of arches. The groins in the vaulting are adorned with foliage and heads. On this altar-piece are carved griffins, dragons, and other grotesque figures. At the north-east of the church stands a building, denominated the abbot's house, the lower part of which is a remnant of that edifice.

A particular history and description of the abbey church, with several plates, illustrative of its architecture, have been published in the first volume of Britton's "Architectural Antiquities of Great Britain."

The remains of the old parish church of St. Paul stands on the southern side of the cemetery, and opposite, on the same side, is the old vicarage house. The building called Chapel-house, on the western side of the town, is supposed to have constituted the chapel of the ancient nunnery, already mentioned. The White-lion inn, and the alms-house, together with the workhouse, and some other buildings, present remnants of more ancient structure, in general dedicated to religious purposes, or connected with monastic establishments.

As

As to the caftle, erected by Roger, bifhop of Sarum, as fome fuppofe on the fcite of an older one, no traces of it can now be difcovered with any certainty; but there is a well, ftill called the Caftle-well, which probably belonged to it. In the market place ftands a very beautiful market crofs of ftone, of an octangular fhape, and much enriched with a variety of fculpture. About a mile fouth from the town lies a field, called "Cam's Hills," in which are two enclofures, one of them perfectly fquare, and the other of an oblong fhape, both of which are ufually efteemed veftiges of a Roman encampment.

Malmefbury no lefs claims the attention of the biographer than of the antiquary, fome of the greateft luminaries of remote and modern times having been born here. Among the more ancient worthies may be reckoned Meydulph, Aldhelm, Johannes Scotus, and Roger le Poer, all of them men diftinguifhed for their piety and learning. William of Malmefbury is one of the moft celebrated hiftorians this country can boaft of; and Thomas Hobbs, whatever prejudice may reply to the affertion, was undoubtedly a philofopher of great acutenefs. He it was who laid the foundation of that moral and metaphyfical fyftem, the illuftration and developement of which have beftowed immortality on the names of Hartley, Hume, and Prieftley. Moffatt's Hiftory, &c. of Malmefbury, 8vo. 1805.

MALMIGNATTO, in *Natural Hiftory*, a name given by the inhabitants of the ifland of Corfica to a fpecies of animal, or large infect, called by fome *tarantula*, and ignorantly fuppofed to be the fame with the tarantula of Apulia. (See TARANTULA.) This ifland produces neither wolves, ferpents, nor many other of the mifchievous and deftructive animals which infeft the neighbouring countries: but it produces two fpecies of this venomous infect, called the *malmignatto;* the one of thefe has a round body, and the other an oblong one, refembling that of our large kind of ant; it has alfo fix legs, not eight, and never makes any web: from all which it appears not to be a fpider, but truly of the ant kind, though a monftrous fized one, and very venomous. The round-bodied kind, by its bite, occafions violent pains, a fenfation of coldnefs and cramps all over the body; and the long-bodied one is yet more venomous. Its fting occafions an immediate lividnefs of the flefh, with intolerable cramps and convulfions over the whole body; fometimes the natural evacuations by ftool and urine are alfo wholly ftopt by it. The cure, in both cafes, is to be attempted by cutting and cauterizing the wound, and dreffing it with Venice treacle, as alfo by giving the fame in large dofes diffolved in wine.

MALMISCH, in *Geography*, a town of Ruffia, in the government of Viatka, on the Viatka; 100 miles S. of Viatka. N. lat. 56° 44'. E. long. 50° 14'.

MALMO, a fmall ifland on the W. fide of the gulf of Bothnia. N lat. 63 13'. E. long. 18 40'.

MALMOE, a fea-port town of Sweden, reckoned by fome writers the capital of Scania or Schonen, fituated on the Sound. This town is furrounded with walls, moats, and baftions, and is defended by feveral fortifications and a caftle towards the fea. Here are two burgo-mafters, a good fchool, one Swedifh and one German church, an orphan-houfe, a large market-place, fine regular ftreets, and feveral woollen manufactures; nine miles S.W. of Lund. N. lat. 55° 36' 37". E. long. 13° 1' 4".

MALMSAS, a town of Sweden, in Sudermanland; 23 miles W.N.W. of Nykoping.

MALMSEY, or MALVASY, a rich lufcious kind of wine brought from Greece or Candia; fo called from Malvafia, a city in Peloponnefus, the ancient Epidaurus, whence this celebrated liquor was firft brought.

That brought from Candia is now efteemed the beft.

MALMSEY, or *Malvify*, is alfo the name of a kind of mufcadine wine brought from Provence.

MALNAIR, in *Geography*, a town of Hindooftan, in the province of Sirhind; 40 miles S.W. of Sirhind. N. lat. 30° 26'. E. long. 75° 25'.

MALNOS, a town of Hindooftan, in the circar of Sirhind; 20 miles W.S.W. of Sirhind.

MALO, a town of Italy, in the Vincentin; 11 miles W. of Vicenza.—Alfo, a town of Africa, in the kingdom of Fonia.

MALO, or *Maloes, St.* a fea-port town of France, and principal place of a diftrict, in the department of the Ille and Vilaine, fituated on a fmall ifland joined to the continent by a mole, at the head of which is a ftrong fort. Before the revolution, it was the fee of a bifhop fuffragan of Tours, who was lord of the town. The harbour is large, and much frequented, though difficult of accefs on account of the rocks which furround it. It is ftrong by its fituation on a peninfula, connected with the land by a narrow mole about fix or feven hundred yards in length, and by the defence of 250 pieces of cannon mounted on its ramparts. But as it has no outworks, its fortifications could not long refift a regular fiege: its ftrength both by nature and art lies towards the fea. Several attempts have been made againft it, at different times, but without fuccefs. It has always been a port for privateers, and on this account has been injurious to the trade of England. N. lat. 48° 39' 3". W. long. 2° 1' 26".

MALO-*de-la-Lande, St.*, a town of France, in the department of the Channel, and chief place of a canton, in the diftrict of Coutances. The place contains 449, and the canton 10,252 inhabitants, on a territory of 140 kiliometres, in 13 communes.

MALOBATHRUM, among the Romans, a precious kind of ointment, brought from the Indies through Syria to Rome.

MALOGOCZ, in *Geography*, a town of Auftrian Poland, in the palatinate of Sandomirz; 60 miles W. of Sandomirz. N. lat. 50° 4'. E. long. 20° 18'.

MALOGRANATUM. See POMEGRANATE.

MALOIAROSLAVETZ, in *Geography*, a town of Ruffia, in the government of Kaluga; 32 miles N. of Kaluga. N. lat. 55°. E. long. 36° 14'.

MALOKETSKOI, a town of Ruffia, in the government of Tobolfk; 30 miles S.W. of Kamfkoi.

MALONG, a town of Hindooftan, in the Carnatic; 18 miles S. of Madura.

MALOOD, a town of Hindooftan, in the circar of Cicacole; 16 miles N.E. of Ganjam.

MALOPE, in *Botany*, is thought by profeffor Martyn to be a corruption of *μαλαχη, a mallow.*—Linn. Gen. 355. Schreb. 467. Willd. Sp. Pl. v. 3. 799. Mart. Mill. Dict. v. 3. Juff. 272. Cavan. Diff 2. 84. Desfont. Atlant. v. 2. 120. Lamarck Illuftr. t. 583. (Malacoides, Tournef. t. 25.)—Clafs and order, *Monadelphia Polyandria.* Nat. Ord. *Columniferæ*, Linn. *Malvaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, double; outer of three, heart-fhaped, acute, permanent leaves; inner of one leaf, more erect, permanent. *Cor.* Petals five; inverfely heart-fhaped, abrupt, affixed at the bafe to the tube of the ftamens. *Stam.* Filaments numerous, united below into a tube, feparate and loofe above; anthers nearly kidney-fhaped. *Pift.* Germens fuperior, roundifh; ftyle fimple, the length of of the ftamens; ftigmas many, fimple, briftle-fhaped. *Peric.* Capfules roundifh, of many cells, equal in number to the ftigmas, forming a little head. *Seeds* folitary, kidney-fhaped.

Eff. Ch. Calyx double, the outer one of three leaves. Capfules irregularly heaped together, fingle-feeded.

1. M. *malacoides.* Linn. Sp. Pl. 974. Cavan. Diff. t. 27. f. 1.—Leaves oblong, obtufe, undivided, notched, fmooth above. Stalks folitary, axillary.—A native of meadows in Tufcany and Algiers.—*Root* annual. *Stem* erect, hairy, rough. *Leaves* fomewhat heart-fhaped; the lower ones obtufe; the upper generally three-lobed. *Flowers* rofe-coloured; the petals wedge-fhaped, truncated. *Fruit* collected into a head, like the blackberry.—The whole plant has greatly the appearance of a mallow, efpecially in the fhape and colour of its flowers. Desfontaines notices a variety of this, whofe leaves and corolla are twice the ufual fize.

2. M. *parviflora.* Mart. Mill. Dict. L'Herit. Stirp. Nov. fafc. 5. 105. t. 50.—Calyx fimple. Leaves almoft heart-fhaped, even. Peduncles fcarcely longer than the petiole. A native of Peru, where it was difcovered by Dombey.—*Root* annual. *Stem* about a foot high, much branched, red, villofe. *Leaves* alternate, on footftalks, nerved, bright green. *Flowers* axillary, on ftalks, folitary, occafionally two together, purple.—Profeffor Martyn obferves that "there are other Peruvian fpecies with a fimple calyx, which might therefore conftitute a diftinct genus."

3. M. *multiflora.* Willd. n. 2. Cavan. Diff. 2. 85.—Leaves roundifh, undivided, notched, villofe. Stalks three or four together, axillary.—A native of Spain.—Cavanilles defcribes it thus. "*Stem* about fix inches high, not much branched. *Flowers* fmall and white. *Fruit* proportionably larger than in the other fpecies."

4. M. *trifida.* Willd. n. 3. Cavan. Diff. t. 27. f. 2.—Leaves oblong, three-lobed, pointed, toothed, fmooth. Stalks folitary, axillary.—Found in meadows both in Spain and Barbary.—Willdenow fays it differs from the laft in having its *leaves* three-lobed, more acute, and thicker.

Malope, in *Gardening,* contains a plant of the herbaceous kind, of which the fpecies cultivated is, the betony-leaved malope (M. malacoides.)

Method of Culture.—This plant may be increafed by fowing the feeds, in the places where the plants are defigned to remain, as it does not bear tranfplanting well; when they are fown upon a warm border in Auguft, the plants alfo frequently ftand through the winter, and flower early the following feafon, fo as to produce good feeds; but when fown in the fpring, this is rarely the cafe.

It is moftly neceffary that the plants fown in the fpring in pots fhould be protected in winter under a frame. They feldom continue longer than two or three years at moft, as good plants.

All of them afford variety among other plants in the borders, clumps, &c. of ornamented grounds.

MALOPINGOVSKOI, in *Geography,* a town of Ruffia, in the province of Ufting; 108 miles N. of Ufting.

MALORN, a fmall ifland in the N. part of the gulf of Finland. N. lat. 65° 32′. E. long. 23° 27′.

MALO-RUSSIANS, the denomination of thofe people who inhabit the country between the Dnieper and the Donetfk, called in the maps Little Ruffia. They are defcribed by Dr. Clarke (Travels in Ruffia) as a race much fuperior to the Ruffians; being not only of a better afpect, but more induftrious, more courageous, more cleanly, and more polite. With regard to their cleanlinefs, a traveller might fancy himfelf tranfported from Ruffia to Holland. In their features, the Malo-Ruffians refemble the Coffacks; and the fimilitude which both bear to the Poles, feems to imply a defcent from a common origin. In one point, however, *viz.* the love of liquor, the Malo-Ruffians are unfortunately as grofs delinquents as their neighbours to the eaftward.

MALORY, a town of Hindooftan, in Myfore; 13 miles N.E. of Ouffoor.

MALOSCHANY, a town of Ruffia, in the government of Pfkov; 24 miles N.E. of Pfkov.

MALOUCA, a town of Syria, which has two churches; 20 miles N.N.E. of Damafcus.

MALOUR, a town of Hindooftan, in Baramaul; 13 miles N. of Namacul.

MALOWITZ, a town of Bohemia, in the circle of Konigingratz; feven miles E. of Gitfchin.

MALOWPOUR, a town of Hindooftan, in Oude; 48 miles W. of Lucknow.

MAL-PADDY, a town of Hindooftan, in Myfore; 11 miles W. of Tripatore.

MALPARTIDA, a fmall town of Spain, in the province of Eftramadura, containing a population of about 1300 inhabitants. It is tolerably well built; and has a handfome parifh church, built with granite, fupplied from an adjacent quarry; about three miles from Placentia.

MALPAS, a mountain of France, through which the Languedoc canal paffes.

Malpas, a market town and parifh in the hundred of Broxton, and county palatine of Chefter, England. It is fituated on a lofty eminence at a fhort diftance from the river Dee. The name of this place is fuppofed to have been derived from the term *Mala-platea,* illuftrative of the fteep, narrow, and intricate road by which it was anciently approached. The manor was one of the baronies granted, at the time of the conqueft, to Hugh Lupus, earl of Chefter, from whom the prefent noble family of Cholmondeley is defcended. The magnificent caftle by which it was adorned for feveral centuries, is now fo entirely demolifhed, that fcarcely a veftige of it can be difcovered. Three ftreets, tolerably well built and paved, form the chief part of the town, which, according to the parliamentary returns of 1801, contained 191 houfes, and 906 inhabitants. In the church is a vault, appropriated as the burying place of the earls of Cholmondeley, who derive their title of vifcount from this town. The living is a rectory, and being very valuable, is divided into two portions, fupporting two rectors, and the like number of curates. Malpas has a free-grammar-fchool and alms-houfe, both of which were founded by fir Randle Brereton. Adjoining the town is Cholmondeley Hall, the magnificent manfion of earl Cholmondeley, a modern building, feated on a pleafant, and fomewhat elevated feite. The ancient ftructure, though venerable in appearance, and moated round, was a very difagreeable refidence, from being placed in a low and marfhy fituation. Lyfons's Magna Britannia, vol. ii. 4to.

MALPICA, a town of Portugal, in the province of Beira; 16 miles S S.E. of Caftel Branco.

MALPICO, a town of Spain, in Galicia, on the fea-coaft; 20 miles W. of Corunna

MALPIEV, a town of Spain, in New Caftile; 25 miles W. of Toledo.

MALPIGHI, Marcello, in *Biography,* a celebrated Italian naturalift, was born at Crevalcuore, near Bologna, in 1628. Having devoted himfelf to the ftudy of medicine, which he felected for his profeffion by the advice of Natalis, his tutor in philofophy, he began to apply himfelf to anatomy

tomy with great zeal under Maſſari, who had a ſchool for diſſection in his own houſe. He ſoon became diſtinguiſhed by the philoſophical ſpirit of obſervation with which he purſued his enquiries, and his ardent zeal for natural knowledge was accompanied with ſingular modeſty. His merit procured him, in 1653, the degree of doctor in medicine, and the appointment of profeſſor of phyſic, in the univerſity of Bologna, in 1656: ſoon after which he was invited to Piſa by the grand duke of Tuſcany, Ferdinand II. This prince, partly from his own hereditary taſte, and partly at the inſtigation of his accompliſhed brother, the cardinal Leopold de Medici, was very deſirous of encouraging the arts and ſciences in his dominions. Here he formed a friendſhip with the celebrated Borelli, to whoſe communications he acknowledges himſelf indebted for the diſcovery of the futility of the philoſophy of the ſchools, and of the neceſſity of experiment as the ſole foundation of a true philoſophy. The air of Piſa, however, did not agree with Malpighi, whoſe health was always delicate, and he was obliged to return to Bologna in 1659, where he was immediately re-appointed to the profeſſorſhip of medicine. Here he reſumed his inquiries with great diligence, and was the firſt who employed the microſcope in examining the circulation of the blood. In 1662, on the death of Caſtelli at Meſſina, Malpighi was invited by the magiſtracy to ſucceed him as profeſſor of medicine in that ſchool, with a large ſalary. He occupied this poſt almoſt four years with conſiderable reputation; but as he paid little reſpect to the doctrines of the Galeniſts and Arabians, and excited much jealouſy in his colleagues, he became involved in controverſies, which rendered his life very uneaſy. He therefore reſolved to return to Bologna in 1666, and accepted the offers of his countrymen to continue among them, notwithſtanding the preſſing invitations which he received from Meſſina to reſume his chair in that city. His anatomical purſuits now occupied a great portion of his time, at a villa, in the vicinity of Bologna; and his reputation extended throughout Europe, as a philoſophical inquirer; ſo that, in 1669, he was elected a member of the Royal Society of London; which body afterwards teſtified their regard for him by printing his works at its own expence. At Bologna, he continued to teach others, and to inſtruct himſelf, with great reputation, till the year 1691. Cardinal Pignatelli, who had known him, during his own reſidence as legate at Bologna, being that year raiſed to the papacy, by the name of Innocent XII. choſe Malpighi for his chief phyſician and chamberlain. The latter of courſe gave up his academical appointments, and removed to Rome, where, having previouſly ſuffered from gout and nephritic complaints, he died of an apoplexy at the palace of Monte Cavallo, November 29th, 1694, in the 67th year of his age. His remains were embalmed, and conveyed to Bologna, where they were interred with great funeral honours in the church of St. Gregory, and a ſtatue was erected to his memory. He was married to the ſiſter of his preceptor Maſſari; but left no iſſue. Malpighi is deſcribed as a man of a ſerious and melancholy temperament, which is confirmed by his portrait in the meeting-room of the Royal Society at Somerſet houſe. He was indefatigable in the purſuit of knowledge, on the ſure ground of experience and obſervation, ever candid in his acknowledgments to thoſe who had given him any information, and devoid of all oſtentation or pretenſion on the ſcore of his own merits. He ranks very high among the philoſophers of the phyſiological age in which he lived, the age of Harvey, of Redi, of Rudbeck, and of Bartholin, when nature began to be ſtudied inſtead of books, and the dreams of the ſchools gave place to practical enquiries and obſervations. Hence aroſe the diſcoveries of the circulation of the blood, the abſorbent ſyſtem of the animal body, and the true theory of generation. To ſuch improvements the inveſtigations of Malpighi, relative to the anatomy and transformation of inſects, particularly the ſilk-worm, and the developement of the chick in the egg, lent no ſmall aid. From theſe enquiries he was led to the anatomy and phyſiology of plants, in which he is altogether an original, as well as a very profound, obſerver. His line of ſtudy was the ſame as that of Grew, but theſe philoſophers laboured independent of each other, and their frequent coincidence evinces the accuracy of both. See Grew.

The firſt work which he publiſhed in 1661, and which was afterwards frequently reprinted, compriſed his microſcopical obſervations relative to the intimate ſtructure of the lungs, and was entitled "Obſervationes Anatomicæ de Pulmonibus," fol. He publiſhed ſeparate tracts concerning the brain, the tongue, the external organ of touch, the omentum, throat, and the adipoſe ducts, between the years 1661 and 1665; and ſubſequently, other tracts reſpecting the ſtructure of the viſcera, the kidnies, ſpleen, liver, membranes of the brain, &c.

Malpighi became a fellow of our Royal Society, as we have already mentioned, in 1669, in which year his eſſay "*de formatione pulli in ovo*" was firſt printed, at London, in quarto, as well as his remarks on the "*Bombyx*" or ſilk-worm, and "De Glandulis conglobatis," forming his three "Diſſertationes Epiſtolicæ." His "*Anatome Plantarum*," addreſſed to the Royal Society, accompanied by obſervations on the incubation of the egg, was publiſhed by that learned body in folio, with many plates, in 1675 and 1679. His works were republiſhed at London in 1686, making two folio volumes; and more correctly at Amſterdam, in 1687, 4to. and a poſthumous volume appeared here, accompanied with an account of his life, in 1697, of which a re-impreſſion was given at Venice, and another at Leyden, the enſuing year. Some other diſſertations are to be found in the "Bibliotheca Anatomica," publiſhed by Le Clerc and Marget at Geneva in 1685; eſpecially "De Cornuum Vegetatione," "De Utero et Viviparorum Avis;" and "Epiſtolæ quædam circa illam de ovo diſſertationem." His only medical work, "Conſultationum Medicinalium Centuria prima," was edited by Gaſpari, in 1713, 4to. Patau. He is not, indeed, diſtinguiſhed as a practitioner, but he deſerves praiſe for pointing out the miſchiefs of blood-letting, in the malignant epidemics prevalent in Italy in his time. An edition of the whole of his works was printed at Venice, in 1733, in folio, by Gavinelli.

The merits of Malpighi as a vegetable anatomiſt are of the higheſt and moſt original kind. The ſtructure and component parts of plants had been little attended to before he entered upon his enquiries. His illuſtrations of their anatomy, as well as of their external configuration, even of ſuch of their diſeaſes as ariſe from the attacks of inſects, whence the various kinds of galls are formed, (ſee Galls,) are all no leſs faithful than original. As a vegetable phyſiologiſt, too, he doubtleſs advanced very far; and that ſubject being ſo entirely new when he and Grew entered upon it, nothing could be more unjuſt than to complain of the errors into which they have fallen. The principal of theſe, however, requires to be mentioned. They both conceived the woody fibres of plants to tranſmit the ſap, though no perforation could be diſcovered in them. If this hypotheſis now excite our wonder, we muſt recollect that no leſs a philoſopher than Du Hamel adopted, and laboured with all his might to ſupport, the ſame opinion. Grew went a ſtep nearer the truth than Malpighi, when he obſerved what they both took for *tracheæ*, or air-veſſels, to be ſometimes filled with ſap; but he did not hence correct his original idea, of those spiral-coated vessels being the lungs of plants, nor were they, till very lately, known to be the real sap-vessels, or arteries of the vegetable frame. (See CIRCULATION *of Sap*, GREW, and DU HAMEL.) Malpighi Opera. Hall. Bibl. Bot. Dryandr. Bibl. Banks. Dict. Eloy Dict. Hist. de la Méd.

MALPIGHIA, in *Botany*, was named by Plumier in commemoration of the scientific attainments of Marcello Malpighi, professor of medicine at Bologna, the celebrated vegetable anatomist; see the last article. Plum. Nov. Gen. 46. t. 36. Linn. Gen. 227. Schreb. 306 and 803. Willd. Sp. Pl. v. 2. 731. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. ed. 2. v. 3. 102. Juss. 253. Cavan. Diss. 8. 405. Lamarck Illustr. t. 381.—Class and order, *Decandria Trigynia*. Nat. Ord. *Trihilatæ*, Linn. *Malpighiæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, deeply five-cleft, erect, very small, permanent, converging; with two honey-bearing, oval, gibbous glands, adhering to three, four, or to all the segments, on the outside at the bottom. *Cor.* Petals five, orbicular, large, plaited, fringed, spreading, concave; with long, linear claws. *Stam.* Filaments ten, awl-shaped, short, erect, forming a cylinder, combined at the base; anthers ovate, or rather heart-shaped *Pist.* Germen superior, ovate; styles three, two, or only one, short; stigmas globose. *Peric.* Drupa globose, torulose, large, one-celled. *Seeds* three or two, bony, oblong, obtuse, angular, single-celled; occasionally solitary, globose, and three-celled. *Kernels* oblong, obtuse.

Eff. Ch. Calyx of one leaf, very deeply five-cleft, with two honey-bearing pores at the base of the segments externally. Petals five, roundish, with claws. Filaments cohering at the base. Drupa of one cell, with three seeds.

Obs. Most authors have described the calyx of *Malpighia* as composed of five leaves, but it is rather to be considered as of one leaf only, very deeply cloven.—We find nine species in Linnæus, thirteen in the new edition of *Hortus Kewensis*, and twenty in Willdenow, from which we select the following as sufficiently illustrative of the genus. Many of them are beautifully figured in Jacquin's works.

M. *glabra*. Smooth-leaved Barbadoes Cherry. Linn. Sp. Pl. 609. Curt. Mag. t. 813.—Leaves ovate, entire, smooth. Peduncles umbellated.—A native of the West India islands, where it is cultivated for the sake of its acid pulpy fruit, in size and shape somewhat resembling our cherries. Jacquin says that the fruit is usually made into a preserve with sugar, but that he has eaten it in a crude state without suffering any inconvenience. This tree flowers in the winter and spring, and grows to the height of sixteen or eighteen feet, seldom however exceeding ten feet in this country. *Trunk* erect, delicately branched. *Leaves* opposite, nearly sessile. *Flowers* in terminal, axillary clusters, of a beautiful pink colour, and sweetly-scented, somewhat like a jasmine.

M. *polystachia*. Many-spiked Barbadoes Cherry. Ait. Hort. Kew. ed. 2. v. 3. 103. Andr. Repos. t. 604.—Leaves entire, oblong, smooth, shining, with two glands at the base underneath. Clusters axillary. Flower-stalks with one gland.—A native of Trinidad, and one of those splendid plants sent over by lord Seaforth when he was governor of Barbadoes. It flowered in the stove of A. B. Lambert, esq. at Boyton, in Wiltshire, in the month of April, whence Andrews's figure was taken.—A *shrub* of free growth. *Branches* twiggy, covered with a brownish *bark*. *Leaves* opposite, large and handsome, on silky bristly stalks. *Flowers* in a spiked cluster, yellow, appearing in November, but not expanding till the spring.

M. *glandulifera*. Quadriglandular Malpighia. Ait. Hort. Kew. ed. 2. v. 3. 103. Jacq. Ic. Rar. v. 3. t. 469.—Leaves elliptic-ovate, acute, undulated, downy, with four glands at the base underneath. Clusters axillary on uniglandular stalks.—A native of woods in the Caraccas, flowering in our stoves about July or August, but never bearing fruit.—This *shrub* is about twelve feet high, branched. *Leaves* opposite, on short footstalks, from three to five inches long. *Clusters* axillary, solitary. *Petals* yellow, crisped at their edges, with furrowed claws and roundish borders.

M. *urens*. Stinging Barbadoes Cherry, or Cowhage Cherry. Linn. Sp. Pl. 609. Cavan. Diss. 8. t. 236. f. 1. (Mespilus americana; Tournef. Inst. 642.)—Leaves oblong-ovate, with rigid, decumbent bristles underneath. Stalks single-flowered, aggregate.—Native of South America, flowering from July to October.—*Stem* about three feet high, covered with a brownish *bark*, much branched. *Leaves* acutely pointed, sessile, very finely clothed beneath with depressed needle-like bristles. *Flowers* of a light purple colour, on long, slender stalks, four, five, or six together in a sort of whorl. *Seed* not perfected in England.

M. *crassifolia*. Thick-leaved Barbadoes Cherry. Linn. Sp. Pl. 610. Brown. Jam. 231. Aubl. Guian. t. 182.—Leaves obovate, acute, entire, downy beneath. Clusters terminal.—Found in the West India islands, and at Guiana.—The *trunk* of this *tree* is sixteen feet or more in height, branched at the summit. *Leaves* opposite, thick, somewhat rigid, smooth and green above, downy and rusty-coloured beneath. *Flowers* in a long, terminal, clustered spike, yellow. Among the Caribbees this plant is called *Moureila*.

M. *volubilis*. Twining Barbadoes Cherry. Ait. Hort. Kew. ed. 2. v. 3. 105. Sims in Curt. Mag. t. 809.—Branches twining. Leaves oval, acute, shining. Clusters corymbose, terminal.—A native of the West Indies, flowering in our stoves during the Autumn.—*Stem* shrubby. *Bark* beset with warty excrescences, of an extremely small size. *Leaves* opposite, drooping, on weak, flattish footstalks. *Flowers* chiefly terminal, yellow, of very short duration.—"This shrub (says Dr. Sims) is known in our nurseries by the name of *Hiræa reclinata*, but does not at all correspond with the character of that plant in Jacquin's *Historia Stirpium Americanarum*."

M. *coccigera*. Linn. Sp. Pl. 611. Jacq. Ic. Rar. t. 470.—Leaves subovate, toothed, or spinous.—Found also in the West Indies.—*Stem* two or three feet high, branched. *Leaves* lucid, cut off apparently at the ends, thorny. *Flowers* lateral, on single-flowered *stalks*, pale blush-coloured.

Professor Martyn has added five species from Jacquin, which are unnoticed by other authors, though perhaps comprehended by them. These are called *martinicensis*, *diphylla*, *odorata*, *grandifolia*, and *altissima*.—Jacquin says also that the fruits of several species of *Malpighia* are gathered promiscuously and eaten in the West Indies. They have a pleasant acid flavour, which is always grateful to the inhabitants of hot climates. M. *glabra* however is most esteemed on this account.—This genus is well deserving of attention from cultivators possessed of stoves or hot-houses, because many of its species retain their leaves all the year, and continue flowering from December to March, when there is the greatest scarcity of other flowers.

MALPIGHIA, in *Gardening*, comprehends plants of the exotic, evergreen, shrubby kind for the stove, of which the species cultivated are, the smooth-leaved Barbadoes cherry (M. glabra); the pomegranate-leaved Barbadoes cherry (M. punicifolia); the stinging Barbadoes cherry (M. urens); the narrow-leaved Barbadoes cherry (M. angustifolia); the shining-leaved Barbadoes cherry (M. nitida);

da); the thick-leaved Barbadoes cherry (M. craffifolia); the mullein-leaved Barbadoes cherry (M. verbafcifolia); and the fcarlet grain-bearing Barbadoes cherry (M. coccigera).

Method of Culture.—All thefe forts of plants may be increafed by fowing the feeds in the fpring in pots of light rich earth, and plunging them in a hot-bed. When the plants have attained a few inches in growth they fhould be planted out into feparate fmall pots, re-plunging them in a bark hot-bed in the ftove; where they fhould remain the two firft winters, being afterwards placed in a dry ftove, and kept in a moderate warmth, water being occafionally given in fmall quantities at a time.

They all afford ornament among collections of plants of fimilar kinds in hot-houfes.

MALPIGHIÆ, in *Botany*, fo called from the principal genus among them, a natural order of plants, the 67th in Juffieu's fyftem, or feventh of his thirteenth clafs. For the characters of this clafs, fee GERANIA and GUTTIFERÆ. The *Malpighiæ* are thus defined.

Calyx in five deep divifions, permanent. *Petals* five, alternate with the calyx, furnifhed with claws, and inferted into a glandular difk placed under the germen. *Stamens* ten, inferted into the fame difk, five of them oppofite to the petals, the five alternate ones oppofite to the fegments of the calyx; the filaments are fometimes united at their bafe, anthers roundifh. *Germen* either fimple or three-lobed; ftyles three; ftigmas three or fix. *Fruit* either confifting of three capfules, or of three cells, the capfules or cells fingle-feeded. *Corculum* deftitute of albumen, with a ftraight radicle, the lobes reflexed at their bafe. The *plants* are either fmall trees or fhrubs. *Leaves* oppofite, fimple, with more or lefs appearance of ftipulas. *Flower-ftalks* fometimes terminal, more frequently axillary, either fingle-flowered and feveral together, or folitary and many-flowered, the flowers either fomewhat umbellate, or fpiked, or panicled, their partial ftalks being, for the moft part, jointed in the middle, and furnifhed there with a pair of fmall fcales.

The firft fection, with a three-lobed germen, and a fruit of three capfules, contains *Banifteria* and *Triopteris*.

The fecond fection, with a fimple germen and fruit, confifts of *Malpighia* alone; fee the preceding article.

A third fection, of genera allied to the above, comprifes *Trigonia* of Aublet, and *Erythronium* of Browne and Linnæus.

Cavanilles refers the genera of this order to the clafs *Monadelphia* of Linnæus, on account of a flight, and by no means univerfal, combination of the bafes of their filaments; or rather perhaps from the infertion of thofe parts into one common annular difk or receptacle. This appears to us to be not only forcing nature, but to lead to much inconvenience in practice. It is the error of thofe who, undertaking the ftudy or explanation of any particular tribe, or family, of natural productions, are ever defirous of augmenting it by all poffible means, and perhaps, with prejudiced eyes, fee almoft every thing as appertaining to their favourite fubject.

MALPLAQUET, in *Geography*, a village of Hainaut, famous for a battle fought there Sept. 11, 1709, between the allies under the command of the duke of Marlborough and prince Eugene, and the French under marfhals Villers and Boufflers. Victory was valiantly and obftinately contefted; till at length the field of battle was abandoned to the confederates, who loft on this occafion 20,000 of their beft troops, whereas the vanquifhed enemy did not lofe half the number; 8 miles S. E. of Mons.

MALPOLON, in *Zoology*, the name of a fpecies of ferpent found in the ifland of Ceylon, and beautifully variegated with red marks in the form of ftars.

MALSARA, in *Hindoo Mythology*, a manifeftation of the goddefs Parvati to accompany her lord Siva, in his avatara, or incarnation, under the name and form of *Kandeh Rao*, which fee. She and her lord are very popular deities in the country of the Mahrattas, where, at the elegant temple of Jejury, they are propitiated by numerous pilgrims. (See JEJURY.) It does not, however, appear that the tales related of this avatara are extenfively known, or that they are to be found in any very ancient books.

MALSCH, in *Geography*, a town of the duchy of Baden; ten miles E. of Spire.

MALSESENA, a town of Italy, in the Veronefe; 18 miles N.N.W. of Verona.

MALSKAR, two fmall iflands in the gulf of Bothnia. N. lat. 61° 55'. E. long. 21° 7'.—Alfo, a fmall ifland on the E. fide of the gulf of Bothnia. N. lat. 61° 55'. E. long. 21° 7'.

MALT, in *Agriculture*, a name applied to barley, after it has undergone the procefs of malting; as by this means it becomes fit for making ale, beer, or other fimilar liquors.

It is faid, that the foil on which barley grows makes a confiderable difference in the grain, and that the barley fitteft for malt is that which grows on a rich, light, or gravelly foil, and which has been raifed from feed brought from a farm of a different foil and fituation. The fulleft and largeft grained parts of fuch crops fhould be chofen for making malt. It fhould be heavy, and perfectly found, and fuch as has not fuffered any accident in the field. Its being a very little heated in the mow is by fome confidered rather an advantage, as the grain will be more equally dried, and will confequently the more equally imbibe water; but when it has been fo much hurt in the mow as to look blackifh when broken at the thick end, it is unfit to make good malt. It is alfo found by experience, that barley taken immediately from the field does not malt fo kindly as that which has been fome time in the houfe or mow. And particular care fhould be taken that it is free from the feeds of weeds; for thefe in the malting are apt to give the grain a bad tafte, which cannot afterwards be got rid of.

It is noticed that in the procefs of germination, all the principles of the grain are put in action. The heat which it undergoes feparates and divides its parts; and the vifcidity which it before poffeffed, is removed or converted into a fweet principle, or fugar.

But in order to its being malted, the barley is put into a ciftern lined with lead or ftone, and covered with water about fix inches deep above the barley, to give room for its fwelling. All the good grains fink in the water, but after ftirring it, the imperfect or diftempered ones rife to the furface. Thefe fhould be fkimmed off, and given to poultry or hogs, for they will never make good malt. By the water's gaining admittance into the barley, a great quantity of the air is expelled, as appears from the number of bubbles which rife on the furface.

It is ufual for the barley to be left in the water two or three days, more or lefs, in proportion to the heat of the weather and the drynefs of the grain. A judgment is formed that grain is fully faturated with water, from its appearing turgid, and eafily giving way to an iron rod, dropped perpendicularly into it. Or, by taking a corn from the middle of the ciftern, and holding it fteadily, by the two ends, between the fore-finger and thumb; preffing it gently, and if it continues firm when fo preffed, and the fkin does not break, it muft foak longer; but if it crufhes together and feels mellow, and the fkin crack, it is watered enough. Nicety in this is a material point, and can be learnt only by experience. If the grain fhould be fuffered to remain too ſong in the water, it would begin to loſe part of its ſweetneſs. When it has been ſteeped ſufficiently, the water is drawn off.

And the water uſed for this purpoſe ſhould be that of a clear running ſtream, or rain-water; or if ſuch cannot be had, pond-water, provided it be ſweet and clean, will do very well; or pump-water, which ſhould be rendered ſoft, if it be naturally hard. If the water made uſe of is any way tainted, it communicates to the malt a taſte which it never loſes.

When taken from the ciſtern, the barley is laid in a regular heap, where it muſt remain thirty hours, or till it contracts a heat. It muſt then be worked in one or more heaps, and turned every four, ſix, or eight hours, according to the temperature of the air; and as it *comes*, as its ſpiring is commonly termed, the heap muſt be ſpread thinner to cool it, leſt it be heated too much, and the germination be carried on too faſt. The turning of it muſt be continued in proportion as it is more or leſs ſlow in growth, ſo that it may be brought tolerably dry to the ſkin. When the ſpires begin to deaden, the couch muſt be thickened again, and often turned, that the growth of the ſprout may not revive. At this time the ſpire ſhould be near piercing through the outer ſkin of the barley; as if it grows quite out, the ſtrength of the malt will be too much conſumed. After the malt is made thus far, the common practice is to lay it at once on the kiln: but the beſt way is to gather it all up in one heap, to let it lie in that ſtate for twelve hours, and then to turn it every fourth hour during the ſpace of twenty-four hours. No perſon ſhould be ſuffered to tread on the malt with their ſhoes while it is on the floor, becauſe many grains are inevitably bruiſed thereby, and theſe, vegetating no longer, afford the roots of the other grains a ſubſtance into which they extend their fibres, and are by that means entangled in bunches: and beſides this, the bruiſed corn acquires a degree of putrefaction which taints the liquor made from the malt. Equal care ſhould alſo be taken, that the grain be not bruiſed by any other means.

According to ſome, the time moſt proper for malting is, when the temperature of the air is ſuch, that the grain naturally begins to germinate. How far the limits may be extended, experience alone can determine. The warmer the weather is, the greater muſt be the diſadvantage under which the maltſter labours; becauſe the motion of the fluids is then ſo ſtrong, that the proceſs goes on too quick, and the finer parts are apt to fly off, the conſequence of which is, that inſtead of a ſweet, the malt inclines to a bitter taſte. This is ſo univerſally experienced, that brewers carefully avoid purchaſing what is termed latter made malt.

The grain thus prepared for drying is ſpread on the kiln, where, meeting with a heat greater than is ſuited to vegetation, its farther growth is ſtopped. It is ſpread on the kiln three or four inches thick, and turned every three or four hours. The laying of it thicker is attended with inconveniences, among which is particularly its being unequally dried; and therefore that ſhould be avoided. The ſtrength and duration of the fire are different, according as the malt is intended to be dried pale, amber, or brown. The pale malt requires more leiſure, and leſs fire, than the amber or brown. Pale and amber malt are dried with coke or culm, which not emitting any ſmoke, give it a brighter colour, and do not communicate that bad flavour which it has when dried with wood, ſtraw, &c. Coke is beſt, as it affords a ſteady and conſtant heat, whereby the malt is dried more uniformly. Where wood, or any vegetable fuel is uſed, it ſhould be extremely well dried, in order that, being as free as poſſible from moiſture, it may yield leſs ſmoke.

An ingenious and attentive maltſter found the degree of heat in the malt whilſt on the floor to be, during the firſt ten days, between fifty and ſixty degrees. During the next three or four days, from ſixty to ſixty-five, and ſeventy-ſeven degrees; and during the laſt days of its being there eighty, eighty-four, and eighty-ſeven; which laſt was the degree of heat when the malt was put on the kiln. There cannot be any abſolute rule as to the difference of heat during the different times in the proceſs of malting, becauſe it muſt be ſuited to the heat of the air; at leaſt we have not yet ſufficient data whereon to found ſuch a calculation. The heat of the malt on the kiln, when fit for pale malt, was 120 degrees, and when it was fit for brown malt, 147.

The obſervation, that malt is fit for what is called pale, when its heat is 120 degrees, ſuggeſts a caution which ſhould be carefully attended to, namely, that whatever colour it be intended to give the malt, the heat at firſt ſhould be the ſame: thus, for example, malt which is dried to the degree of high brown, ſhould firſt be rendered pale malt, then amber, and ſo on progreſſively; not by a ſudden increaſe of the fire, but by a longer continuance of it. In this manner the whole body of the grain is equally and gradually dried; whereas a ſtrong and quicker fire would parch, or as it were, ſinge the outſide, while the internal parts remained moiſt; and as that moiſture is afterwards evaporated, it muſt crack the ſurrounding hardened cruſt, and damage the grain in another reſpect.

As ſoon as the malt is dry, it muſt be removed from the kiln, and ſpread thin, that it may cool to the temperature of the air. It cannot be ſuppoſed that any of its parts are capable of retaining the heat in ſuch a manner as not to ſuffer it to eſcape, though ſome have conceived that to be the caſe. In proportion as malts are dried, their particles are more or leſs ſeparated, and coming in contact with water, they ſtrongly attract from it particles which fill up their interſtices. In maſhing, this action between the malt and the water generates a ſmall degree of heat, but not durable; though from hence aroſe the opinion, that brown malt is full of fire or heat.

It ſhould be ſtated that the ſize of the malt-kiln ſhould be proportioned to the quantity of malt for which it is intended. Some build their kilns ſquare, and others make them round; but this laſt is undoubtedly the beſt form, as the heat of the fire is more equally diffuſed therein, and the grain is of courſe more equally dried. Various ſubſtances have been made uſe of for covering the kiln, ſuch as tiles, plates of tin, and wire: of theſe the wire is to be preferred, becauſe it does not contract ſo great a degree of heat as to parch the grain in contact with it; but for this very reaſon, hair-cloth is probably preferable to any other covering; as when any part of the malt is in immediate contact with a ſubſtance much more ſolid than itſelf, and therefore capable of receiving a proportionally greater degree of heat, the malt in contact with that heated body is parched or burnt, by the heat which is not equally diffuſed through the whole maſs; which maſs cannot, therefore, be all equally heated. The hair-cloth is ſpread upon ſmall wooden rafters, and theſe are ſupported by bars of iron laid acroſs the kiln. See Kiln.

There can be little doubt that the grain may, at a medium, be ſaid to loſe by malting one-fourth of its weight, including what is ſeparated from it by the ſpires ſcreened off; but this proportion varies according as it is more or leſs dried. The condition of the barley, as to its greenneſs or ripeneſs, at the time of its being gathered in, is clearly diſcernible when it is malted. If it was gathered green, it rather loſes than gains in quantity; the malt becomes

comes of a ſmaller body, appears ſhrivelled, and often is unkindly hard; whilſt, on the contrary, that which was cut at full maturity increaſes in malting, appears plump, bright, and clear, if properly carried through the proceſs, and on being cracked, readily yields that fine mealy ſubſtance ſo much deſired by the brewers.

Malt which has not had a ſufficient time to ſhoot, ſo that its plume, or *acroſpire*, as the adepts in malting call it, may have reached the inward ſkin of the barley, remains charged with too large a quantity of its unattenuated matter. All thoſe parts which have not been put in motion by the act of germination being, when laid on the kiln to dry, ſo hardened as not to be readily ſoluble in water, and conſequently will be loſt to the ſtrength of the liquor. When it is ſuffered to grow too much, or until the ſpire has ſhot through the ſkin of the barley; though all that is left be malt, yet, as too large a portion of its eſſential part will have been expended in vegetation, the malt muſt be greatly diminiſhed in proportion to what it ought to have been, and what remains cannot be ſo fit for brewing drink for long keeping. And ſuch as has been duly worked on the floor will, if it has not been ſufficiently dried on the kiln, be apt to germinate or ſprout afreſh, perhaps take on a very great heat; and ſhould it continue long with a moderate degree of heat, the leaſt evil that can be expected is, that it will grow mouldy and have an ill flavour. When it has been well worked, but over dried, it will be ſo hardened, that it will not imbibe from the air that moiſture which is neceſſary to mellow it, and render it fit for brewing; for when it has been previouſly ſoftened by the moiſture of the air, it mixes more eaſily and more intimately with the water, and by that means yields a more copious extract than it would otherwiſe do. Such malt as has juſt, or but lately been taken from the kiln, remains warm a conſiderable time. Until it becomes as cool as the ſurrounding air, it does not mellow by the addition of a due quantity of moiſture from the air; and the wort made of ſuch malt requires a much longer boiling before it breaks, than that which is made of malt ſome months old.

The practice of ſprinkling water upon malt newly taken from the kiln, to give it the appearance of having been made a proper time, or to plump it, is highly prejudicial, as tending not only to defraud, as leſs grain fills the buſhel, but if not uſed ſpeedily, heats, ſoon grows mouldy, and ſuffers great damage.

It is obvious, that malt dried on a kiln not ſufficiently heated muſt require a proportionably longer time for it to receive the due effect of the fire; for want of which it will be in the ſame ſtate as that not thoroughly dried. Or if the fire be too quick, or too fierce, inſtead of gently evaporating the water from the corn, it ſcorches the outward ſkin, and ſeparates it from the body of the grain. The malt to which this happens is called brown malt, and is very bulky; and if ſuch a fire be continued, it changes ſome parts of the grain into ſo brittle a ſubſtance, that the malt is ſaid to be glaſſy. The particles which are thus hardened will not diſſolve, or but in ſmall proportion; ſo that they frequently occaſion an almoſt total want of extract, which, in the phraſe of the art, is termed the ſetting the *griſt*.

It is ſuggeſted that the goodneſs of malt may be known by the following marks: when a grain of it is broken, and it taſtes mellow and ſweet, breaks ſoft, and is full of flour from one end to the other, it is good. If it has a round full body, and upon putting ſome grains into water, they ſwim on the ſurface, it is good. Barley ſinks in water, and malt that is not well made will do the ſame: but it is to be obſerved that this is not an invariable proof, becauſe, if the malt be broken, or in the leaſt cracked, it will take in water, and ſink. Malt that is rightly made will not be hard, but of ſo mellow a nature, that if drawn over an oak board, acroſs the grain, it will leave a white line upon the board, like a mark of chalk. Its ſmell alſo may be conſulted; for malt, though otherwiſe good, may have contracted an ill ſcent from the fuel, or from the water uſed in the ſteeping.

In reſpect to the changing the water in ſteeping, ſome maltſters think it no wiſe neceſſary; others, on the contrary, approve of it, but do it indiſcriminately in the ſame proportion during the whole ſeaſon. They are probably in both reſpects wrong; for the times when the water requires to be changed ofteneſt, are the beginning and latter end of the ſeaſon, in autumn and ſpring, when the weather is warm; for in the middle of the winter the weather is too cold to admit of the water being at all changed to any advantage. Suppoſe the barley to be left in ſteep forty-eight hours in the ſpring; if the weather is inclinable to be warm, the water may in that ſpace of time be changed three times; in other caſes twice may be enough: but the beſt rule is, as it is well known, that in the autumn and ſpring, if barley is left too long on the ſteep in the ſame water, the water will grow ſlimy, and ſometimes ſour: the maltſter ſhould watch the changes of the water, and when he finds that it is ſmooth and oily to the touch, and that it is inclinable either to ſmell or taſte ſour, let him by all means have it inſtantly changed; but he muſt obſerve, if he regards his intereſt, a particular method even in doing this. The uſual way of changing the water is, firſt to draw off that in which the barley was ſteeping, and afterwards, by pails full, or by pumping, fill the ciſtern again. But it is adviſed, as a better method, to have ſome water in readineſs to pour on immediately after the firſt is withdrawn, as by that means the danger of heating is prevented. Much miſchief often ariſes from the not changing the water at theſe ſeaſons.

In converting this ſubſtance to the purpoſe of brewing, it ſhould be freed from the tails and duſt before it is ground, which would otherwiſe heighten the colour of the wort, render the liquor muddy, and give it a bad taſte, which cannot afterwards be got rid of. A cylindrical ſieve will be uſeful for this purpoſe.

In grinding, when too ſmall, its flour will mix too freely with the water, and cauſe the wort to run thick. Many are of opinion that the beſt way is only to crack it, ſo that none of the grains may come out whole; for the intent is, that the water ſhould draw out an extract, but not be mixed with the mealy part, in the manner of a paſte or gruel. Some think that malt is better ground by a ſtone-mill than by a ſteel one, becauſe the former bruiſes it, and the latter only cuts the grains.

After it is ground it ſhould lie ſome time to mellow in a cool room, where no ſun comes. The time for this is different, according to its kind. Brown malt may be ground as from three to four or five days before it is uſed, in order that the corn, which is rendered uncommonly hard by the degree of drying, may be gradually ſoftened by the moiſture of the air; by which means it will become the more ſoluble in water. The pale malts require only one or two days. After lying thus in the air, leſs maſhing ſuffices; the ſtrength of the malt is more perfectly extracted, and the beer will be conſiderably ſtronger than it would be with the ſame quantity of malt taken directly from the kiln; but care muſt be taken that it get no damage

damage in lying. Further experiments on these points, however, are wanting to render them satisfactory. See Brewing.

In addition to what has been stated above, on the drying of malt, an experienced maltster remarks, that his constant practice has been to give his malt as much drying as he could on the floor; this is not only a great saving of fuel, but also attended with several other advantages. The malt, by being thus gradually divested of its outward moisture, does not shrink so much when it comes to be laid on the kiln; and of course it measures to more advantage, and is besides of a better quality, having acquired no foreign taste. It is supposed that where malt is laid very damp on the kiln, a thick smoky vapour immediately arises from the surface of it, which, being repelled and condensed by the cold circumambient air, falls again on the malt, where, by the heat from the furnace, it is a second time rarefied, and ascends in clouds of steam; and that this alternate rarefaction and condensation of the moisture is of great disservice to the malt, by often giving it a disagreeable musty flavour, and making it more unfit for keeping. But by the method of suffering the malt to receive a part of its drying on the floor, this inconvenience is, it is believed, in a great measure avoided; as the gross moisture is evaporated before it is laid on the kiln, and that which remains creates no great degree of steam, provided the fire in the furnace is not at first made to burn too fierce. The above maltster states that with this precaution he has often made pale malt as fine as he has seen any where, such as was constantly praised. In drying it, he took care that there was, during the whole time it was on the kiln, but a very moderate, yet equal, fire in the furnace.

It is suggested in the fifth volume of the Farmer's Magazine, that the best *pale malt*, for making beer, is only capable of being produced by drying it with steam; and that such grain as is intended to be malted, should have its dampness corrected, and be rendered fit for keeping only by the heat of steam, as it is known that exposure to a naked fire, however cautiously managed, destroys a great part, if not the whole, of the embryo germs of seeds.

In order to have malt highly dried, as some like brown malt better than pale, when the moisture was nearly evaporated, the above-mentioned maltster caused the fire to be gradually increased till it roared in the furnace, taking care that the malt should be properly stirred, lest it proved kiln-burnt; and by this method he had a fine, sweet, brown malt, fit for making harvest beer, such as some farmers are very fond of brewing.

It is the opinion of some, that brown malt, used in the same proportion with pale, will make the strongest beer; but this is certainly a mistake, as the above maltster has often made the experiment with great precision, but could never find any material difference, and what difference there was at any time, seemed to him to be rather in favour of the pale than the brown malt: this may easily be accounted for, as the flour in the pale malt always remained sound and uninjured in the drying; while the brown malt sometimes, notwithstanding all the care of the maltster, is liable to be injured or parched by the fire, and that part must, of course, lose much of its virtue. It is, however, noticed, that such pale malts as are slack dried make a raw, unwholesome liquor, which will not keep well, but if pale malt be gradually and slowly dried by an uniform gentle heat, it will certainly answer the character he has given of it, and besides, keep as well as any brown malt whatever, as he has fully experienced.

It is stated, that in the spring and autumn, the making of malt in all its branches is a very critical business; as it is then particularly necessary that the beds, or couches, should be frequently turned, or the malt will not come kindly: as the first root will be apt to shoot forth vigorously, starving the other roots, and preventing them from accompanying it in its growth: this must be checked, and the remedy is, to turn the couch often, spread it thin, and give it a sufficient quantity of air, at the same time keeping it cool and temperate. This will stop the progress of the first root, give the others time to sprout, and the barley will then malt kindly and more regularly.

A thin-skinned fine-coated barley is said to be best for making malt, and it is not worse for not being very full-bodied; but a lean, half-starved, unripe grain should not by any means be recommended. And such as has grown on lands highly manured is not so good for making malt as that which has been produced on land of a moderate richness without it. In fact, a luxuriant soil, whether naturally so or enriched by art, is not, in general, best for yielding barley for the maltster's use. Some prefer, for malting, a grain which is the produce of a soil that is rather poor than rich, rather light than strong, and more inclined to a gravel than a clay; as this grain is clean-coated, taper, and elegant in its form, is full of flour, mostly transparent when watered, and will be sufficiently wetted in forty-eight hours. It also increases in the malting, fills the bushel well, and makes a fine, sweet, wholesome, clean, full-bodied malt, from which the best beer may be brewed, either brown or pale, according as the malt has been dried higher or lower.

Mixed grain, or such as is grown on various soils, and in different situations, should never be purchased when it can be avoided, as it will be apt to disappoint the buyer, from the kernels spiring at different times, and some of them not at all; so that after the couch is dried, some part of it will only be half malted, and a great deal not malted at all.

The following method is recommended to discover malt that has been made of mixed, or in part unripe barley. Take a bowl of water, throw into it a couple of handfuls of the malt, giving it a gentle stirring, and the barley which has not been malted will sink to the bottom; the half-malted grains will have one end sunk, being in a vertical position; and the true good malt swim. It is, however, remarked, that the same barley, though ever so good, will not malt alike well at all times: for instance, take it as soon as it is housed, it comes well, but while it is in its sweat, by no means so; yet after it has done sweating, it comes well again, and barley which has been got in early in a very dry season, makes but indifferent malt; while the same barley, if it is left abroad till rain falls on it to loosen the husk from the kernel, malts very well, and yields a large increase. Also old barley, mixed with that of the last harvest, does not malt well, as it does not all spire or put forth its beard, at the same time. These niceties, though little attended to, are of importance in the making of good malt in all cases.

Several regulations relating to the manufacture and sale of malt are enacted by various and successive acts of the British legislature: of which the principal are as follow.

By 12 Ann. stat. 1. cap. 2, continued yearly, and by 33 Geo. II. cap. 7, there shall be paid by the maker for all malt made in England, except it be made for exportation only (12 Geo. c. 4.) a duty of nine-pence a bushel: and by 19 Geo. III. c. 25, an additional duty of 15*l. per cent.* which duty is under the management of the commissioners and officers of excise. (See Tax, *Malt.*) By 43 Geo. III. c. 69,

c. 69, additional duties are likewife impofed. The laft annual malt act is the 50 Geo. III. c. 1. Every maltfter fhall take out a licence from the office of excife annually, paying for the fame 5*s*., if the quantity of malt made by him fhall not exceed within the year, ending the 23d of June in each year previous to his taking out fuch licence, the quantity of 50 quarters.

				£.	s.	d.
If above	50	and under	100	0	10	0
	100		150	0	15	0
	150		200	1	0	0
	200		250	1	5	0
	250		300	1	10	0
	300		350	1	15	0
	350		400	2	0	0
	400		450	2	5	0
	450		500	2	10	0
	500		550	2	15	0
	550			3	0	0

and a furcharge.

And every perfon who fhall firft become a maltfter, for every fuch licence 5*s*. and within 10 days after the 5th of July next after taking out fuch licence, fuch further additional fum as with the faid 5*s*. fhall amount to the duty hereinbefore charged, according to the quantity of malt made by him within the preceding year. (43 Geo. III. c. 69.) If he fhall neglect to take out fuch licence and renew the fame annually, 10 days at leaft before the end of the year, he fhall forfeit 10*l*. (24 Geo. III. c. 41.) No malt fhall be imported, on pain of forfeiting the fame and its value. (12 Ann. ftat. 1. c. 2.) By the fame act places for making malt are to be entered, on pain of 50*l*.

The maltfter is required to give 24 hours notice within a city or market town, and elfewhere 48 hours notice in writing to the officer, of the time of the day when he intends to wet the corn to be made into malt; and he fhall not begin but between eight in the morning and two in the afternoon: nor empty any grain out of the ciftern, &c. ufed for wetting or fteeping, except between feven in the morning and four in the afternoon: the omiffion of fuch notice, &c. incurs a forfeiture of 100*l*. by 3 Geo. III. c. 13. 42 Geo. III. c. 38. 48 Geo. III. c. 74.

Out of every 20 bufhels of malt, gauged and charged upon the floor, after the fame fhall have been taken out of the ciftern or other utenfil, by the fpace of 26 hours or more, and before it fhall be dried upon the kiln, fhall be allowed 10 bufhels, and fo in proportion for any greater or lefs quantity. But if corn be continued under water for 40 hours, before the water be taken from it, the maltfter fhall not be entitled to the faid allowance. (42 Geo. III. c. 38. 33 Geo. II. c. 7.) Every round bufhel, with a plain bottom, 18½ inches wide throughout, and eight inches deep, fhall be deemed a legal Winchefter bufhel. (12 Ann. ftat. 1. c. 2.) No maltfter fhall wet, fprinkle, &c. any corn or grain in the procefs of being made into malt, after the fame has been emptied out of the fteeping veffel, until the expiration of 12 days, or 288 hours, on pain of 200*l*. (48 Geo III. c. 74.) And if malt be wetted after it hath been taken from the kiln, and before it be delivered to the brewer who may have agreed for the fame, except in the ordinary procefs of brewing beer from fuch malt; every fuch offence fhall incur a forfeiture of 100*l*. (42 Geo. III. c. 38.) And by 48 Geo. III. c. 74, the penalty incurred by every workman, who fhall wet corn contrary to the provifions above-mentioned, is 50*l*., and in default of payment, commitment to the houfe of correction for a term, not exceeding 12 months. But a maltfter may drain water from grain whilft fteeping before the expiration of 40 hours after being firft wetted; provided that no fuch water fhall be drained unlefs the maltfter fhall have given notice of the fame and the precife time between eight in the morning and four in the afternoon; nor fhall the water be drained more than once during the faid fpace of 40 hours, and fuch corn or grain fhall be again completely covered with water within one hour from the beginning fo to drain. (42 Geo. III. c. 38.) Servants of maltfters beginning to wet or remove any corn or grain, in a manner contrary to this act, may be fined 50*l*. by any juftice, who may commit him for non-payment. (48 Geo. III. c. 74.) By 42 Geo. III. c. 38, excife officers may at all times enter every malt-houfe or place ufed for the making of malt, and furvey; and the penalty of obftruction is 200*l*. (See 44 Geo. III. c. 34.) And if the officer fhall refufe or neglect (after demand in writing, 12 Geo. II. c. 28.) to leave a copy of the gauge for the maker at the time of taking it, he fhall forfeit 40*s*. The officer fhall meafure corn making into malt by the gauge only, and not by the bufhel. (12 Ann. ft 1. c. 2.) By 2 & 3 Edw. VI. c. 10, no perfon fhall make any barley malt, except in June, July, and Auguft, which fhall not be three weeks at leaft in making; nor in thefe months, under 17 days, (unlefs it be for his own houfe,) on pain of forfeiting for every quarter 2*s*.; and felling of malt, which has not been well dreffed, fo that there may not be fanned out of one quarter half a peck of duft or more, incurs a forfeiture of 20*d*. for every quarter: and mixing bad malt with good for fale is liable to a forfeiture of 2*s*. for every quarter. In the procefs of malting, preffing of malt in the ciftern to prevent its fwelling, mixing corn of one wetting with corn of a former wetting, and mixing malt with unmalted corn, incur each of them a penalty of 5*s*. a bufhel. (1 Geo. III. c. 3. 2 Geo. II. c. 1. 1 Geo. I. c. 2. 48 Geo. III. c. 74.) Again, mixing of malt that has been gauged with the ungauged, fubjects to a forfeiture of 200*l*. (1 Geo. III. c. 3.) By 48 Geo. III. c. 74, if any maltfter fhall tread, ram, or otherwife force together in the ciftern, &c. any grain fteeping or fteeped in order to its being made into malt, he fhall forfeit 100*l*. inftead of the fum of 5*s*. for every bufhel of corn or grain fteeping or fteeped, that fhall be fo trodden, &c. mentioned in 48 Geo. III. c. 2.; and if any corn or grain, in the procefs of making malt, be found fo hard and compact, as to manifeft its having been forced together for preventing its rifing and fwelling, the maltfter, &c. in fuch cafe fhall forfeit 100*l*.

If any maltfter, &c. fhall fraudulently conceal any grain making into malt from the view of the gauger, or officer appointed to take an account of the fame, he fhall forfeit 200*l*. (48 Geo. III. c. 74.) And any maltfter fraudulently conveying away from the ciftern, &c. any fteeping or part of any fteeping of corn making into malt, fo that no gauge can be taken in the back by the officer, fhall forfeit 100*l*. (1 Geo. III. c. 3. 48 Geo. III. c. 74.) By the latter act, the penalty for erecting or extending cifterns, &c. for the manufacture of malt, without previous notice, is 200*l*. The maltfter is required to make monthly entry at the office of excife of all the malt made by him in fuch month (for fale or not for fale), on pain of 100*l*. (12 Ann. ftat. 1. c. 2. 44 Geo. III. c. 34.) By 48 Geo. III. c. 74, every maltfter fhall within the fpace of 14 days, next after the time of entry (as before) clear away all the duties, unlefs fecurity fhall have been given, to the fatisfaction of the commiffioners of excife, by bond in double the value of fuch duties as are likely to become due within any five months, for the due payment

payment at the end of every four months at the day of entry, and if such security be not given, and any maltster, &c. neglect to clear off at the end of 14 days such sums as shall have become due, he shall for every such offence forfeit double the duties.

A drawback of the duty is allowed for malt damaged in exportation, and also for malt destroyed by fire or water. (12 Ann. stat. 1. c. 2.) By the 12 Geo. c. 4. and 33 Geo. II. c. 7, no malt entered and made for exportation shall be liable to the duties, and no drawback shall be allowed for any malt exported. By 1 Geo. III. c. 3. and 44 Geo. III. c. 16, there shall be allowed for every 20 quarters of grain made into malt for exportation 30 quarters of malt and no more, on exportation: and notice shall be given of steeping and the quantity, on pain of 50*l.* and this shall be kept separate from that designed for home consumption, on pain of 5*s.* a bushel, (12 Geo. c. 4.) and the corn of one steeping shall be kept separate from any other, until it hath been measured, on pain of 50*l.* (3 Geo. II. c. 7.) Persons opposing officers shall forfeit 50*l.* (12 Geo. c. 4.) Notice of measuring shall be given; and the malt carried on ship-board, or kept separate and locked up, on pain of 50*l.* (12 Geo. c. 4. 3 Geo. II. c. 7. 50 Geo. III. c. 1.) Opening such locks, and carrying away the malt, without consent of the officer, or notice given to him, incur a forfeiture of 100*l.* (3 Geo. II. c. 7. 50 Geo. III. c. 1.) The officer having received 40 hours notice shall attend, keep an account of the malt delivered out, and of the person to whom it belongs, and give a certificate to the officer of the division to which it is to be removed, who shall file the same and make entry thereof: and if the proprietor neglect to deliver such certificate, he shall forfeit 50*l.* (12 Geo. c. 4.) Those intending to ship malt for exportation shall give 48 hours notice to the officer of the port in writing, with the name of the ship, on pain of 5*s.* a bushel. The ship shall be locked, and persons breaking open the hatches, forfeit 50*l.* The landing of malt after shipping for exportation, subjects, besides the penalty of the bond for its exportation, to a forfeiture of the same, and treble the value. (1 Geo. III. c. 3. 50 Geo. III. c. 1.) Storehouses shall be cleared out in 15 months, on pain of 50*l.* Unmalted oats or barley mixed among malt for exportation incurs a forfeiture of 5*s.* a bushel. (6 Geo. c. 21.) If ground malt shall be exported, it shall be computed at so many bushels as it contained before it was ground. (12 Ann. st. 1. c. 3.) The penalties relating to this article (unless otherwise directed) shall be sued for, levied and mitigated as by the laws of excise, or in the courts at Westminster; half to the use of the king, and half to him that shall sue. (6 Geo. c. 21. 24 Geo. II. c. 40. 44 Geo. III. c. 38.) Persons aggrieved may appeal to the next quarter sessions, giving six days notice in writing. (12 Ann. st. 1. c. 2. 1 Geo. II. st. 2. c. 16.) The act 48 Geo. III. c. 74. has made several alterations of the penalties and regulations pertaining to the making of malt, and enacted several provisions by which maltsters and makers of malt are to ascertain, and make entry of the quantity of barley in their possession, and also other provisions for rendering appeals more certain; for which we refer to the act itself. (See BARLEY and CORN.)

The infusion of malt has been much recommended as an antiscorbutic. See SCURVY and WORT.

Good malt may be made of the grain of the maize or Indian corn, but then a particular method must be taken for the doing it. Our barley malt makers have tried all their skill to make good malt of it in the ordinary way, but to no purpose; that is, the whole grain will not be this way malted or rendered tender and floury, as in other malt; for it is found, by experience, that this corn, before it be fully malted, must sprout out both ways, that is, both root and blade, to a considerable length, that of a finger at least and if more the better. For this purpose it must be laid in a heap a convenient time; and in this process, if it be of a sufficient thickness for coming, it will quickly heat and grow mouldy, and the tender sprouts will be so entangled, that the least moving of the heap will break them off; and the farther maturation of the grain into malt, will be hindered by this means; and on the other hand, if it be laid thin, and often stirred and opened to prevent too much heating, those sprouts which have begun to shoot cease growing, and consequently the corn again ceases to be promoted to the mellowness of malt. Phil. Trans. N 142.

To avoid all these difficulties, the following method is to be used: take away the top of the earth in a garden or field, two or three inches, throwing it up half one way, and half the other; then lay the corn for malt all over the ground so as to cover it; the earth that was pared off is now to be laid on again, and nothing more is to be done till the field is all over covered with the green shoots of the plant. The earth is then to be taken off, and the roots of the grain will be found so entangled together, that they will come up in large cakes or parcels; it must be gently washed in order to take off all the dirt, and then dried on a kiln, or on a clean floor exposed to the sun. Every grain of the maize will be thus transmuted into good malt, and the beer brewed with it will be very pleasant and very wholesome, and of an agreeable brown colour, but very clear.

It may be worth trying whether the same process is not with due care applicable to the malting of turnips, potatoes, carrots, parsnips, and the like. It might possibly be of service also to attempt this less laborious way of making malt of barley and other small grains: the disadvantages would be the not so easily separating the dirt from the grain as in the larger kind; and as barley requires the root only, not the ear, to shoot in order to the making of malt, it would be some difficulty to know the exact time of taking it up; but with all these disadvantages the method is worth a trial.

MALT-*Dust*, in *Agriculture*, the dust or substance that separates from the malt in the act of drying, or during its preparation. It is sometimes called malt-combs, and has been found useful as a manure, in lessening the cohesion of stiff heavy soils. But it may probably be made use of to the greatest advantage, as a top dressing when sown over crops in the early spring season. The following experiments are recorded, with respect to the disputed point of its being more adapted to barley than wheat crops. It has often been asserted, by some, that malt-dust is much better suited as a manure to barley than wheat; as from the latter lying a whole year in the ground, and the malt-dust being sown with it, the virtues of the manure are exhausted long before the summer, when the corn principally wants nourishment; being too early advanced in its growth, and rendered winter-proud by it; while others, contradicting this assertion, say it is best for wheat, making it appear, that it often causes very good crops of corn, particularly after a hard winter. In order to make some experiments to ascertain this matter, a field of ten acres was fixed upon, which had borne a good crop of horse-beans; after which it was sown with turnips which, being fed off, it was summer-fallowed, being intended for wheat. The soil was a stiffish loam, in good heart, and tolerably clean. It was divided by by deep furrows into ten equal parts, each containing one acre, and numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10. The whole field during the courfe of the fallowing had four ploughings given it, which reduced it to a fine tilth or mould. As wheat-feed time came, No. 1 was fown broad-caft, with three bufhels of wheat, and ploughed in, laying on no manure whatever. No. 2 was fown with the fame quantity of wheat, after which ten quarters, or eighty bufhels, of malt-duft were ftrewed over it, and that and the feed ploughed in together. No. 3 was alfo fown with wheat in the fame manner, except that the ftrewing on the malt-duft was deferred till the latter end of January. No. 4 had a dreffing of dung in the ordinary way, and was fown with three bufhels of wheat like the other parts. No. 5 was dreffed by fheep-folding, and was alfo in like manner fown with wheat. No. 6 was fown with wheat in the fame quantity: and in February, after fowing, received a half dreffing of very rotten dung which had been feveral times turned and mixed. No. 7, after receiving a ploughing in the fpring, was fown with ten pecks of barley, which was harrowed in, and no manure at all applied. No. 8 was fown with barley, as above, but had ten quarters of malt-duft laid on it. No. 9 had in the winter a good dreffing of dung, and was in the fpring fown with the fame quantity of barley. No. 10 was fown with barley, like No. 8, only it had five inftead of ten quarters of malt-duft laid on it.

It is obferved, that all the pieces of wheat were fown the firft week in October, and all the barley the fecond week in March. In January, on examining the wheat, it was found that the acre marked No. 2 looked moft forward and flourifhing; though there was in appearance but little difference between that and No. 4. The Nos. 1, 3, and 6, neither of them looked fo vigorous as thofe already-noticed; and No. 5 feemed rather thin on the land; but the wheat-plants were in good condition and healthy. And on another examination in May, of the wheat-crops, it was found that No. 1 was tolerably clean and promifed well; and No. 2 gave hopes of a large crop, and was furprifingly clear of weeds. No. 3 was greatly improved fince the laying-on of the dreffing of malt-duft. No. 4 looked very vigorous and ftrong, but was very foul, having feveral forts of weeds not to be met with in other parts of the land. No. 5 was thin of plants, and they did not branch much: however, they ftill feemed healthy and ftrong. No. 6 was like No. 3, greatly improved; but it was foul, and what appeared ftrange, had many weeds of a nature quite different from thofe with which No. 4 was infefted, though the dung laid on both thefe parts was taken from the fame heap.

And at this time, on looking at the pieces fown with barley, No. 7 was found promifing and clean. No. 8 was forwarder, and afforded the profpect of a large crop. No. 9 was forward and fine, but foul with weeds. No. 10 bore much the fame appearance as No. 1, and promifed well.

At harveft, No. 2 of the wheat was firft fit to reap, after which fucceeded No. 4; the reft were ready nearly at the fame time.

Of the barleys, Nos. 8 and 10 were firft ready to mow.

It is almoft unneceffary to obferve, that thofe crops which were cleareft of weeds were the fooneft fit for carrying.

Thefe crops were all laid feparately, as well as all feparately threfhed, and dreffed as early as poffible in the winter.

The produce of the feveral crops, on being diftinctly noted, were the following:

Crops.	Produce. Bufhels.	Pecks.
No. 1, manured, wheat - -	20	1
— 2, manured with malt-duft when fown	28	3
— 3, manured with malt-duft after Chriftmas, by way of top-dreffing -	40	1
— 4, manured with dung in the ordinary way - - - -	32	2
— 5, folded with fheep - - -	29	3
— 6, dreffed with rotten dung in February	30	0
— 7, unmanured barley - - -	32	3
— 8, manured with ten quarters of malt-duft when fown - - -	48	0
— 9, manured with dung in the winter -	40	2
— 10, manured when fown, with five quarters of malt-duft - - -	44	0

From thefe trials it is concluded, firft, that when malt-duft is ufed as a manure for wheat, it is the beft to lay it on by way of top-dreffing after the corn is come up, as the crop of No. 3 yielded above twelve bufhels more than that of No. 2; and it is fuppofed that the virtue of the malt-duft laid on No. 2 was exhaufted before it could be of any effential fervice to the crop, whereas, in No. 3 the manure began to yield forth its virtues juft as the wheat-plants began to be in want of a frefh fupply of nourifhment. It was alfo evident, that the grains of wheat which grew on No. 2 were thinner and had lefs fubftance than thofe of No. 3, the grain of which was fine, plump, and heavy.

It was alfo clear, from the produce of No. 4, that malt-duft is, in many cafes, a better manure for wheat than dung, not only as it gives a larger increafe, but alfo becaufe it does not ftock the land with deftructive and devouring weeds.

The wheat grown on No. 5, was as fine as that of No. 3, but confiderably lefs in quantity, as appears by the account.

The method purfued in No. 6 is not defirable: it is a good alternative, if the farmer happens to have too little dung to drefs all his fallow-lands with.

It is alfo fuppofed that malt-duft is a very good and profitable manure for a barley crop; but the yielding of No. 10 being forty-four bufhels, and of No. 8 only forty-eight bufhels, which laft is not an increafe in proportion to the additional quantity of manure laid on, it may be concluded, that eight quarters, or fixty-four bufhels, of malt-duft is the proper quantity to lay on an acre for a barley crop, and that at the time of fowing. In fpeaking of malt-duft, it is meant the kiln-duft, or that which falls from the malt in drying: as to the tail-duft, that falls through the fcreen whilft the malt is cleaning before it is put in facks, that may be applied to a better ufe, being generally given to pigs, and often to cows, in which laft cafe it makes them give a great deal of milk.

It has been fuggefted that the virtue of malt-duft, as a manure, lafts only for one crop; but this is a miftake, for when the manure is laid on in January or February, a good crop of the green kind may be had after the wheat.

This manure is fuppofed to be of a very warm nature; this has induced many farmers to think that it may burn crops; and it may, perhaps, do fo on a hot gravelly foil; but on clay land or a ftiff loam, it feldom or ever does any damage: and indeed the only danger is a dry time enfuing after it is fpread on the land, for the firft fhower of rain wafhes it in, and fecures the crop from all hazard of being burnt or injured in that way.

It is fuppofed by fome, that malt-duft is for a ftiff foil

a better

a better manure than dung; but the difficulty is, whether it is moſt profitable to lay it on when the wheat is ſown, or by way of top-dreſſing in January or February. The above experiments ſeem to ſhew, that the beſt time to dreſs heavy land with it, is in January or the following month.

It is alſo ſtated, that nothing ſurpaſſes this manure when laid on cold graſs grounds, to the amount of about eight quarters or ſixty buſhels an acre. Its effects in this way are ſaid to be very great.

In an experiment of Mr. Bedford's, in which a piece of land was manured with this ſubſtance at the rate of four quarters to the acre, and ſown with barley and clover, the barley was very luxuriant, producing near ſeven quarters *per* acre, and the clover extremely fine; from which it is concluded, that it is a valuable ſort of manure, being cheaper than rape-duſt or any other ſort of top-dreſſing, as it only coſts about twelve ſhillings the acre.

About Dunſtable this ſort of manure coſts one ſhilling a buſhel, is ſown by hand at the rate of from twenty-four to thirty-two buſhels the acre over the barley land, and harrowed-in with the ſeed. It is ſeldom uſed to wheat in that diſtrict, but would probably anſwer well to it as a top-dreſſing, in the proportion of about thirty buſhels to the acre, ſown over the crops in March.

The black malt-duſt, or that which falls through the kiln-plate, is preferable to the white, from the ſeeds of weeds being deſtroyed by the heat in drying.

MALT, *for the manner of preparing liquors of*, see BREWING.

MALT *Liquors* have different names as well as different virtues, properties, and uſes, both from the different manners of preparing the malt, whence they are diſtinguiſhed into *pale* and *brown*; and from the different manners of preparing or brewing the liquors themſelves, whence they are divided into *beer* and *ale*, *ſtrong* and *ſmall*, *new* and *old*.

Malt drinks are either pale or brown, as the malt is more or leſs dried on the kiln; that which is the ſlendereſt dried, tinging the liquor leaſt in brewing, and therefore being called *pale*: whereas that higher dried, and as it were roaſted, makes it of a higher colour. A mixture of both theſe makes an amber colour; whence ſeveral of theſe liquors take their name.

Now, it is certain, the pale malt has moſt of the natural grain in it, and is therefore the moſt nouriſhing; but for the ſame reaſon, it requires a ſtronger conſtitution to digeſt it. Thoſe who drink much of it, are uſually fat and ſleek in their bloom, but are often cut off by ſudden fevers; or, if they avoid this, they fall early into a diſtempered old age.

The brown malt makes a drink much leſs viſcid, and fitter to paſs the ſeveral ſtrainers of the body; but, if very ſtrong, it may lead on to the ſame inconveniences with the pale; though a ſingle debauch wears off much more eaſily in the brown.

Dr. Quincy obſerves, that the beſt pale malt liquors are thoſe brewed with hard waters, as thoſe of ſprings and wells, becauſe the mineral particles, with which theſe waters are impregnated, help to prevent the coheſions of thoſe drawn from the grain, and enable them to paſs the proper ſecretions the better; as the viſcid particles of the grain do likewiſe defend theſe from doing the miſchief they might otherwiſe occaſion. But ſofter waters ſeem beſt ſuited to draw out the ſubſtances of high-dried malts, which retain many fiery particles in their contexture, and are therefore beſt loſt in a ſmooth vehicle.

For the differences in the preparation of malt liquors, they chiefly conſiſt in the uſe of hops, as in beer; or in the more ſparing uſe of them, as in ale.

The difference made by hops is beſt diſcovered from the nature and quality of the hops themſelves: theſe are known to be a ſubtle grateful bitter: in their compoſition, therefore, with this liquor, they add ſomewhat of an alkaline nature, *i. e.* particles that are ſublime, active, and rigid. By which means, the ropy viſcid parts of the malt are more divided and ſubtilized; and are, therefore, not only rendered more eaſy of digeſtion and ſecretion in the body, but alſo, while in the liquor, they prevent it from running into ſuch coheſions as would make it ropy, vapid, and ſour.

For want of this, in unhopped drinks, that clammy ſweetneſs, which they retain after working, ſoon turns them acid, and unfit for uſe; which happens ſooner or later, in proportion to the ſtrength they receive from the malt, and the comminution they have undergone from fermentation.

It is a common opinion, that ale is more diuretic than beer, that is, liquor leſs hopped more than that with a greater quantity of hops in it: which may hold in ſome conſtitutions, becauſe ale being more ſmooth, ſoftening, and relaxing, where urine is to be promoted by enlarging the paſſage, as in thin, dry conſtitutions, this is the moſt likely to effect it. But where the promoting of urine is to be done by attenuating and breaking the juices, and rendering them more fluid, it is certainly beſt anſwered by thoſe drinks which are well hopped.

As to the diſpute, whether or no hops tend to breed the ſtone, it is too long to enter upon here. Quincy is of opinion, there is but little reaſon for the affirmative ſide of the queſtion; and, in general, makes no ſcruple to ſay, that, for one conſtitution damaged by beer, there are numbers ſpoiled by ale. This laſt manifeſtly fouls the glands, ſtuffs the veſſels with ſlime and viſcidity, makes the body unwieldy and corpulent, and paves the way for cachexies, jaundice, aſthmas, and at laſt incurable dropſies. The urinary paſſages, alſo, which it is ſuppoſed to clear, will, in time, be filled by it with ſlough, and matter of as ill conſequence as gravel.

The different ſtrengths of malt liquors alſo make their effects different. The ſtronger they are, the more viſcid parts they carry into the blood; and though the ſpirituous parts make theſe imperceptible at firſt; yet when thoſe are evaporated, which will be in a few hours, the other will be ſenſibly felt by pains in the head, nauſeouſneſs at the ſtomach, and laſſitude or liſtleſſneſs to motion. This, thoſe are the moſt ſenſible of, who have experienced the extremes of drinking theſe liquors and wines; for a debauch of wine they find much ſooner worn off, and they are much more lively and briſk afterwards, than after intemperately uſing malt liquors, whoſe viſcid remains will be long before they be ſhaken off.

Malt liquors, therefore, are, in general, the more wholeſome for being ſmall, *i. e.* of ſuch a ſtrength as is liable to carry a ſmall degree of warmth into the ſtomach, but not ſo great as to prevent their being proper diluters of the neceſſary food. Indeed, in robuſt people, or thoſe who labour hard, the viſcidities of the drink may be broken into a convenient nouriſhment; but in perſons of another habit and way of living, they ſerve rather to promote obſtructions and ill humours.

The age of malt liquors is the laſt thing by which they are rendered more or leſs wholeſome. Age ſeems to do nearly the ſame thing as hops; for thoſe liquors which are longeſt kept are certainly leſs viſcid; age breaking the viſcid

cid parts, and, by degrees, rendering them ſmaller, and fitter for ſecretion.

But this is always determined according to their ſtrength; in proportion to which, they will ſooner or later come to their full perfection, as well as decay; for, when ale or beer is kept till its particles are broken and comminuted as far as they are capable, then it is that they are beſt; and, beyond this, they will be continually on the decay, till the finer ſpirits are entirely eſcaped, and the remainder becomes vapid and ſour.

MALT *Diſtillery*. This is an extenſive article of trade, and by which very large fortunes are made. The art is to convert fermented malt liquors into a clear inflammable ſpirit, which may be either ſold for uſe in the common ſtate of a proof ſtrength, that is, the ſame ſtrength with French brandy; or is rectified into that purer ſpirit uſually ſold under the name of ſpirit of wine; or made into compound cordial waters, by being diſtilled again from herbs and other ingredients. See BREWING, SPIRITS, and WASH.

To brew with malt in the moſt advantageous manner, it is neceſſary, 1. That the ſubject be well prepared; 2. That the water be ſuitable and duly applied; and, 3. That ſome certain additions be uſed, or alterations made, according to the ſeaſon of the year, and the intention of the operator; and by a proper regulation in theſe reſpects, all the fermentable parts of the ſubject will thus be brought into the tincture, and become fit for fermentation.

The due preparation of the ſubject conſiſts in its being juſtly malted and well ground. When the grain is not ſufficiently malted it is apt to prove hard, ſo that the water can have but very little power to diſſolve its ſubſtance; and if it be much malted, a part of the fermentable matter is loſt in that operation. The harder and more flinty the malt is, the finer it ought to be ground; and in all caſes, when intended for diſtillation, it is adviſable to reduce it to a kind of finer or coarſer meal. When the malt is thus ground, it is found, by experience, that great part of the time, trouble, and expence of the brewing is ſaved by it, and yet as large a quantity of ſpirits will be produced; for thus the whole ſubſtance of the malt may remain mixed among the tincture and be fermented and diſtilled among it. This is a particular that very well deſerves the attention of the malt diſtiller, as the trade is at preſent carried on; for the diſpatch of the buſineſs, and the quantity of ſpirit procured, are more attended to than the purity or perfection of it.

The ſecret of this matter depends upon the thoroughly mixing, or briſkly agitating and throwing the meal about, firſt in cold, and then in hot water; and repeating this agitation after the fermentation is over, when the thick turbid waſh being immediately committed to the ſtill, already hot and dewy with working, there is no danger of burning, unleſs by accident, even without the farther trouble of ſtirring, which in this caſe is found needleſs, though the quantity be ever ſo large, provided that requiſite care and cleanlineſs be uſed; and thus the buſineſs of brewing and fermenting may very commodiouſly be performed together, and reduced to one ſingle operation. Whatever water is made choice of, it muſt ſtand in a hot ſtate upon the prepared malt, eſpecially if a clear tincture be deſired, but a known and very conſiderable inconvenience attends its being applied too hot, or too near to a ſtate of boiling, or even ſcalding with regard to the hand. To ſave time in this caſe, and to prevent the malt running into lumps and clods, the beſt way is to put a certain meaſured quantity of cold water to the malt firſt; the malt is then to be ſtirred very well with this, ſo as to form a ſort of thin uniform paſte or pudding; after which the remaining quantity of water required may be added in a ſtate of boiling, without the leaſt danger of making what, in the diſtillers language, is called a pudding.

In this manner the due and neceſſary degree of heat in the water, for the extracting all the virtues of the malt, may be hit upon very expeditiouſly, and with a great deal of exactneſs, as the heat of boiling water is a fixed ſtandard which may be let down to any degree by a proportionate mixture of cold water, due allowances being made for the ſeaſon of the year, and for the temperature of the air.

This little obvious improvement, added to the method juſt above hinted for the reducing brewing and fermentation to one operation, will render it practicable to very conſiderable advantage, and the ſpirit improved in quality as well as quantity.

A much more profitable method than that uſually practiſed for the fermenting malt for diſtillation, in order to get its ſpirit, is the following: Take ten pounds of malt reduced to a fine meal, and three pounds of common wheatmeal: add to theſe two gallons of cold water, and ſtir them well together, then add five gallons of water boiling hot, and ſtir all together again. Let the whole ſtand two hours, and then ſtir it again, and when grown cold, add to it two ounces of ſolid yeaſt, and ſet it by looſely covered in a warmiſh place, to ferment.

This is the Dutch method of preparing what they call the waſh for malt ſpirit, whereby they ſave much trouble, and procure a large quantity of ſpirit: thus commodiouſly reducing the two buſineſſes of brewing and fermenting to one ſingle operation. In England the method is to draw and maſh for ſpirit as they ordinarily do for beer, only inſtead of boiling the wort, they pump it into large coolers, and afterwards run it into their fermenting backs, to be there fermented with yeaſt. Thus they beſtow twice as much labour as neceſſary, and loſe a large quantity of their ſpirit by leaving the groſs bottoms out of the ſtill for fear of burning.

All ſimple ſpirits may be conſidered in their different ſtates of low wines, proof ſpirit, and alcohol, the intermediate degrees of ſtrength being of leſs general uſe; and they are to be judged of only according as they approach to, or recede from, theſe. Low wines, at a medium, contain a ſixth part of pure inflammable ſpirit, five times as much water as ſpirit neceſſarily ariſing in the operation with a boiling heat. Proof goods contain about one-half of the ſame totally inflammable ſpirit; and alcohol entirely conſiſts of it. See SPIRITS.

Malt low wines, prepared in the common way, are exceedingly nauſeous; they have, however, a natural vinoſity, or pungent agreeable acidity, which would render the ſpirit agreeable to the palate, were it not for the large quantity of the groſs oil of the malt that abounds in it. When this oil is detained in ſome meaſure from mixing itſelf among the low wines, by the ſtretching a coarſe flannel over the neck of the ſtill, or at the orifice of the worm, the ſpirit becomes much purer in all reſpects; it is leſs fulſome to the taſte, leſs offenſive to the ſmell, and leſs milky to the eye. (Shaw's Eſſay on Diſtillery.) When theſe low wines, in the rectification into proof ſpirits, are diſtilled gently, they leave a conſiderable quantity of this groſs fetid oil behind them in the ſtill along with the phlegm; but if the fire be made fierce, this oil is again raiſed and brought over with the ſpirit; and being now broken ſomewhat more fine, it impregnates it in a more nauſeous manner than at firſt. This is the common fault both of the malt diſtiller and

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of the rectifier; the latter, instead of separating the spirit from this nasty oil, which is the principal intent of his process, attends only to the leaving the phlegm in such quantity behind, that the spirit may be of the due strength as proof or marketable goods, and brings over the oil in a worse state than before. To this inattention to the proper business of the process, it is owing that the spirit, after its several rectifications, as they are miscalled, is often found more stinking than when delivered out of the hands of the malt distiller. All this may be prevented by the taking more time in the subsequent distillations, and keeping the fire low and regular, the sudden stirring of the fire, and the hasty way of throwing on the fresh fuel, being the general occasions of throwing up the oil by spurts, where the fire in general, during the process, has not been so large as to do that mischief.

The use of a balneum Mariæ, instead of the common still, would effectually prevent all this mischief, and give a purer spirit in one rectification, than can otherwise be procured in ten, or indeed according to the common methods at all.

Malt low wine, when brought to the standard, or proof spirit, loses its milky colour, and is perfectly clear and bright, no more oil being contained in it than is perfectly dissolved by the alcohol, and rendered miscible with that proportion of phlegm, which is about one-half the liquor; its taste also is cleaner though not more pleasant; there being less of the thick oil to hang on the tongue in its own form, which is not the case in the low wines, where the oil, being undissolved, adheres to the mouth in its own form, and does not pass lightly over it.

When proof spirit of malt is distilled over again, in order to be rectified into alcohol, or, as we usually call it, spirits of wine, if the fire be raised at the time when the faints begin to come off, a very considerable quantity of oil will be raised by it, and will run in the visible form of oil from the nose of the worm. This is not peculiar to malt spirit, but the French brandy shews the same phenomenon, and that in so great a degree, that half an ounce of this oil may be obtained from a single piece of brandy.

Malt spirit, more than any other kind, requires to be brought into the form of alcohol, before it can be used internally, especially as it is now commonly made up in the proof state, with as much of this nauseous and viscous oil as will give it a good crown of bubbles. For this reason it ought to be reduced to an alcohol, or totally inflammable spirit, before it is admitted into any of the medicinal compositions. If it be used without this previous caution, the odious taste of the malt oil will be distinguished among all the other flavours of the ingredients.

Malt spirit, when it has once been reduced to the true form of an alcohol, is afterwards more fit for all the curious internal uses than even French brandy, it being after this purification a more uniform, hungry, tasteless and impregnable spirit, than any other spirits which we esteem so much finer.

A pure spirit being thus procured, should be kept carefully in vessels of glass or stone, well stopped to prevent the evaporation of any of its volatile part. If preserved in casks, it is apt to impregnate itself very strongly with the wood. The quantity of pure alcohol obtainable from a certain quantity of malt, differs according to the goodness of the subject, the manner of the operation, the season of the year, and the skilfulness of the workman; according to which variations, a quarter of malt will afford from eight or nine, to thirteen or fourteen gallons of alcohol. This should encourage the malt distiller to be careful and diligent in his business, as so very large a part of his profit depends wholly on the well conducting his processes.

After every operation in this business, there remains a quantity of faints, which in their own coarse state ought never to be admitted into the true spirit; these are to be saved together, and large quantities of them at once wrought into alcohol. It is easy to reduce these to such a state, that they will serve for lamp spirits. Their disagreeable flavour being corrected by the adding of aromatics during the distillations, the reducing them to a perfect and pure alcohol is practicable, but not without such difficulties, as render it scarcely worth the trader's while. One way of doing it is by distilling them from water into water, and that with a very slow fire. By this means a pure alcohol may be made out of the foulest faints.

The malt distiller always gives his spirit a single rectification *per se*, in order to purify it a little, and make it up proof, but in this state it is not reckoned fit for internal uses, but serves to be distilled into geneva and other ordinary compound strong waters for the vulgar.

The Dutch, who carry on a great trade with malt spirit, never give it any farther rectification than this, and it is on this account that the malt spirit of England is in general so much more in esteem. The Dutch method is only to distil the wash into low wines, and then to full proof spirit; they then directly make it into geneva, or else send it as it is to Germany, Guinea, and the East Indies, for the Dutch have little notion of our rectification. Their spirit is by this means rendered very foul and coarse, and is rendered yet more nauseous by the immoderate use they make of rye meal. Malt spirit, in its unrectified state, is usually found to have the common bubble proof, as the malt distiller knows that it will not be marketable without it.

The whole matter requisite to this is, that it have a considerable portion of the gross oil of the malt well broke and mixed along with it; this gives the rectifier a great deal of trouble if he will have the spirit fine; but in the general run of the business, the rectifier does not take out this oil, but breaks it finer, and mixes it faster in by alkaline salts, and disguises its taste by the addition of certain flavouring ingredients. The spirit loses in these processes the vinosity it had when it came out of the hands of the malt distiller, and is, in all respects, worse, except in the disguise of a mixed flavour. Shaw's Essay on Distillery.

The alkaline salts used by the rectifier, destroying the natural vinosity of the spirit, it is necessary to add an extraneous acid in order to give it a new one. The acid they generally use is the *spiritus nitri dulcis*; and the common way of using it is the mixing it to the taste with the rectified spirit: this gives our malt spirit, when well rectified, a flavour somewhat like that of French brandy, but this soon flies off; and the better method is to add a proper quantity of Glauber's strong spirit of nitre to the spirit in the still. The liquor in this case comes over impregnated with it, and the acid being more intimately mixed, the flavour is retained. See SPIRITUS *nitri dulcis*.

MALTA, in *Geography*, anciently *Ogygia* and *Melite*, from which latter the Saracens have formed *Malta*, an island in the Mediterranean, about fifty miles from the coast of Sicily, twenty miles long, and twelve miles in its greatest breadth, and about sixty miles in circumference. It consists of an immense white soft rock of free-stone, covered with a thin stratum of earth, most of which has been brought from Sicily, seldom more than a foot above the surface of the rock; and this earth is removed once in ten years,

years, in order to clear the rock of a thick cruft which forms, and prevents the moifture from fufficiently penetrating, It was anciently reckoned a part of Africa, but now belongs to Europe. The foil, watered by the night-dew and well cultivated, produces cumin-feed, anife-feed, cotton, excellent fruits, fuch as melons, oranges, lemons, and particularly figs, vegetables, and paftures; but it yields neither grain nor wine fufficient for its inhabitants, who are eftimated at about 63 or 64,000, including thofe in the neighbouring iflands. It furnifhes plenty of excellent and finely-flavoured honey, fea-falt, confiderable fifheries, and a profitable coral-fifhery. The ifland is divided into fmall inclofures of free-ftone, is well planted, and contains feveral towns and villages; the principal of the former are La Valetta, Citta Vittoriofa, Senglea, Barmola, Citta Nuovo Cottonera, and Malta. The coaft is for the moft part fecured by fhelves and perpendicular rocks, without one port or fafe road for fhips; but on the eaft and weft fhores there are feveral commodious harbours. The two moft confiderable are thofe on the S. E. fide, one called Marza Murzet, and the other Marza, which fignifies *port*, and is the largeft of the two. They are divided by an oblong peninfula, on which is built a ftrong fort or caftle, called St. Elmo, which defends the entrance into both. Within that of Murzet lies a fmall ifland, near which the fhips fufpected of infection are obliged to perform quarantine. Thofe places which are acceffible are defended by fortifications of great ftrength, fo that it would be very difficult to reduce it by force. Mortars, the mouths of fome of which are fix feet wide, are cut out of the rocks near the different creeks, where a debarkation might be attempted. Confiderable quantities of fea-fhells and fifhbones petrified are found all over the ifland, even in parts moft elevated and remote from the fea.

During fummer Reaumur's thermometer is generally below 25°, and feldom above 28°, or from about 88° to 95° of Fahrenheit. In the winter it is feldom lower than 8° below zero of Reaumur's, or 14° of Fahrenheit. The alternate changes from heat to cold are often very fudden. Cold is occafioned by the north and north-weft winds; and a fouth wind brings heat. This wind, paffing over the barren fultry continent of Africa, is dangerous, but is of no long duration, and frequently fucceeded by a calm, during which the heat is fuffocating. Whilft the firocco continues, iced beverages are copioufly ufed; and, therefore, fnow is confidered at Malta as one of the neceffaries of life. It is brought from Sicily, and adminiftered to the fick; and whenever there is a fcarcity, all that remains in the ice-houfe in entirely referved for the ufe of the hofpitals. Cold bathing is alfo fuccefsfully ufed as a prefervative againft the ill effects of the firocco.

This ifland has often changed its mafters. Its original inhabitants were the Phæacians, who were expelled by the Phœnicians, and thefe again by the Greeks. It next became fubject to the Carthaginians, and they were fucceeded by the Romans, who eftablifhed in it a prefect, as he is called in the Acts of the Apoftles, ch. xxviii. 7, and this prefect was dependent on the prætor of Sicily. Upon the declenfion of the Roman empire, it fell under the dominion of the Goths, and afterwards of the Saracens. Roger, the Norman, earl of Sicily, took poffeffion of it about the year 1190; and from that time it continued under the dominion of the kings of Sicily, till it fell under that of Charles V., by his conqueft of Naples and Sicily, who gave it in 1525, by a grant which was ratified by the pope in 1530, to the knights of Rhodes, afterwards of Malta. (See the next article.) Charles V. was induced to make this grant by an ambition of becoming the reftorer and fecond founder of an order, which for many ages had been devoted to the defence of Chriftians, and alfo by the hope of thus protecting the ifles of Sicily and Sardinia, the kingdom of Naples, and the coafts of Italy from the incurfions of the infidels; ftipulating with the knights that they fhould maintain a perpetual war againft the Turks and Corfairs. Thefe knights, after their eftablifhment in Malta, fortified the ifland. Solyman, incenfed by obferving that his fhips were conftantly expofed to the attacks of enemies, which he had, in his own imagination, deftroyed when he drove them from Rhodes, determined, in 1565, to make an attempt againft Malta. For this purpofe he fent 30,000 men againft the town of Malta, which was defended by 700 knights and 8000 foldiers, under the command of the grand mafter John de Valette, at the age of feventy-one years. When fome of his friends faw that their brave commander was wounded, they intreated him to retire; but he replied, "At feventy-one, can I finifh my life more glorioufly than by dying with my brethren?" After having fuftained a fiege of four months, they were relieved by a force of 6000 men, fent from Sicily to their fuccour, and the Turks were compelled to raife the fiege.

Hence this town obtained the name of "Citta Vittoriofa," which it retains to this day: La Valetta was built by La Valette, and called after his name. One of his fucceffors made a magnificent aqueduct in 1616, to bring water to this new city; and others conftructed various works of importance to the fafety of the place. When the town was finifhed, the convent and habitation of the knights were removed hither. That the work might not be interrupted, when money failed, they paid in copper, which was afterwards called in at its full value. The infcription on it was, "Non æs fed fides," not money but loan. In procefs of time this ifland maintained itfelf againft the whole Ottoman power; but the order was never rich enough to attempt foreign conquefts, nor to equip numerous fleets. They were, however, as liberal as they were brave in affifting their neighbours, and alfo in defending themfelves againft the Turks and the Corfairs of Algiers and Tripoli. In the year 1724, a truce was concluded with the Turks for twenty-one years, fubject to renewal if both parties fhould think proper. While it continued, the Maltefe were to enjoy in the ftates of the grand feignior the fame privileges as the French. They alfo ftipulated for the exchange and ranfom of flaves. The fultan agreed not to give any affiftance to the ftates of Barbary; and the treaty was to be void when any of the Chriftian princes were at war with the Porte. In 1798 the ifland furrendered to the French, and the knights were difperfed; and in September 1800, it was taken by the Britifh, who retained the poffeffion of it. The principal difadvantages, fays Barrow (Travels in Southern Africa, vol. ii.), that would refult to England by leaving Malta in the poffeffion of the French, appear to be, in the firft place, the power it would give them of excluding our fhips from that port, undoubtedly the beft in the Mediterranean, and of increafing their forces here to the complete deftruction of our Mediterranean trade; and, fecondly, the means it affords of facilitating their views upon Egypt, by enabling them to throw into that country a force fufficient to renew their project upon India. See the next article.

Before the knights took poffeffion of that ifland, it was fo barren and uninviting, that when Charles V. offered it to them, they fent commiffaries to examine, and after their report, they could hardly be induced to accept the grant. But by fubfequent exercifes of fkill and induftry, they have

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effected a furprifing alteration, not only in its means of defence, but in its internal cultivation. The capital of the ifland is "La Valetta," or Citta Nuova, which is fituated on the eaft coaft, and was founded, as we have already obferved, in 1566, on an elevated peninfula, having at its extremity the caftle of St. Elmo. This town contains the palace of the grand mafter, the arfenal, the infirmary, the church of the prior of St. John, and hotels for the knights of different languages. On either fide of the peninfula is a good harbour. "Citta Vittoriofa" is a fortified town on a narrow point of land that projects into the Marza, or great harbour, oppofite to Valetta, and is defended by the ftrong caftle of St. Angelo, ftanding on a high rock, and communicating with the town by a bridge. In this town was the palace of the inquifition, an arfenal, and a lodgment of flaves; the Greeks have alfo a church here. "Senglea," or the ifle of St. Michael, is a confiderable town on a peninfula, feparated from Citta Vittoriofa by the canal Porto della Galere, and joined to the harbour by the canal Porto della Rennella. But we muft not confound this Malta with old Malta, called "Citta Vecchia." Melita, or Medina, the capital, was a confiderable town previous to the arrival of the knights of Rhodes; it is now a fmall fortified place and bifhop's fee, containing a cathedral and feveral religious houfes, on an eminence near the centre of the ifland. In its vicinity are extenfive catacombs, which form a labyrinth. "Barmola" is a little town of 700 houfes behind Senglea. "Citta Nuovo Cottonera" is a regularly fortified town, including the old fort of St. Margherita. The five towns above enumerated, may be confidered as portions of one large city, feparated from each other by havens, and containing 20,000 inhabitants. The houfes are built of ftone, flat-roofed, and covered with plaifter. The harbours are capable of receiving whole fleets; and, as the fituation is naturally ftrong, no art is wanting to render the fortifications impregnable.

"Forte di S. Thomaffo" ftands on a point of land projecting into the fea, about two miles S.E. of the capital, "Malta." "Forte Roffo" ftands on a peninfula oppofite to the ifland of Comino.

The climate of Malta is not infalubrious: the exceffive heat being mitigated by the wefterly and north-wefterly winds. Although there are no rivers in the ifland, there are interfperfed fome excellent fprings of frefh water; but where thefe fail, the people are forced to dig wells in the rock. Their towns are commonly fupplied by rain-water, which they preferve in cifterns. Fuel is very fcarce, as there is little wood upon the ifland; fo that the common people are under a neceffity of ufing dried cow-dung or wild thiftles to drefs their meat, heat their ovens, and warm their apartments in cold weather. Although pafturage is fcarce, they breed here a great number of fheep and goats, whofe flefh is exquifite, as they chiefly feed on aromatic plants that grow on the rocks. Here are hogs in abundance, and good affes, mules, and fome horfes that are fed with barley and chaff. The poultry are large; thofe of the wild kind, particularly partridges, come from other countries in large flights, efpecially in the months of March and October.

The Maltefe refemble the inhabitants of Barbary; and their language is nearly the fame, being the old Punic or Arabic, which is very differently fpoken in different places. But in the city of Valetta and among perfons of rank the language moft in ufe is the Italian. The natives are induftrious, active, economical, and brave; but they are mercenary, paffionate, jealous, fuperftitious, and vindictive. Their drefs in general confifts of a cotton fhirt, a veft, a cloak, with a girdle round the waift. They alfo wear trowfers, and a fort of fhoes called "korch," which is merely a leathern fole, with ftrings to faften it round the leg. Their cap is white or coloured. They are remarkably temperate; a clove of garlic, or an onion, anchovies dipped in oil, and falted fifh, being their ufual diet. On great feftivals they eat pork.

Their principal trade is in cotton; of which a great quantity is annually exported. The imports are corn, cloth, wood, oil, wine, brandy, &c. As they are feldom without cruifers at fea, their captures of the Turkifh and Barbary corfairs conftitute the principal branches of their commerce; for they are thus able to furnifh Sicily and other parts of the Levant, with fpices, fugar, and other commodities, in return for which they bring back grain, pulfe, flefh, both frefh and falted, wood, oil, falt, and other neceffaries. But the chief profit of thefe goes to the order, the native inhabitants having no other fhare than by the exchange they make of them with the produce of their own lands and induftry. The forces of the ifland, exclufive of the knights and thofe who belong to the order, confift of thofe who are able to bear arms, and who are in general robuft and well difciplined. They are obliged, at the firing of the fignal cannon three times, to appear under their proper ftandards, in all their martial accoutrements. Under the difcipline of the Maltefe knights, they are become expert in the ufe of fire-arms. They are alfo reckoned good horfemen. Every knight that has four fcudi *per* day is obliged to maintain a horfe for his own ufe and at his own charge. The number of gallies which the order furnifhes is greater or lefs, according to the exigence of the occafion. Thefe gallies are ftrongly built, well manned and commanded; having ufually each 100 warriors and 25 knights on board; and that, which is called the "Capitania," and carries the ftandard of the order, has moft commonly 30 knights. Befides thefe, they have a number of galleons, and other inferior veffels, the crews of which confift chiefly of flaves, of whom they have feldom lefs than two or three thoufand. All along the coaft the ifland is well garrifoned and fortified; and on the leaft appearance of danger, beacons are fet on fire on the high grounds, and thefe fignals are anfwered by the firing of the city guns; fo that the alarm is foon fpread through the whole ifland. The grand mafter has the whole revenue of Malta, as well as of Gozo, over which he is invefted with the fovereign power during his life. His revenues arife from a certain tax upon the ifland, and include the duties on falt goods imported and exported, and fuch like imports. Thefe, with fome additional perquifites, formerly amounted, *communibus annis*, to about 60,000 crowns. Boifgelin's Ancient and Modern Malta, &c. 3 vols. 4to.

Malta keeps accounts in fcudi of 12 tari, each taro being fubdivided into two carlini, 20 grani, or 120 piccioli. Thefe monies of account are valued both in filver money and copper money; meaning by copper money (not metal) but the current value of the coins of the ifland, and by filver money their value in foreign exchange. Silver money is to copper money as three to two. The gold coins are double, fingle, and half Louis-d'ors, coined by the grand mafter Rohan, at 20, 10, and 5 fcudi, copper or current money. The filver coins are ounces and half ounces, coined by the fame grand mafter, at 30 and 15 tari; fcudi and halves, at 12 and 6 tari; pieces of one, two, and four tari, all in current money. The real copper coins are tari, and pieces of 10, 5, 2½, and 1 grani. Spanifh quadruples pafs for 38¾ fcudi; Venetian fequins for 6 fcudi; Dutch ducats for 5⅓ fcudi; Sicilian ounces for 6¼ fcudi; Spanifh dollars

dollars for $30\frac{1}{3}$ tari; current or copper money. The fineneſs both of gold and ſilver is expreſſed in carats; but the gold is divided into 24 carats, and the ſilver into 12. Gold and ſilver are weighed by the pound of 12 ounces; the ounce is divided into 16 parts, or 32 trapeſi; and the trapeſo into 18 grani. This pound weighs 4888 Engliſh grains; ſo that 720 lb. or oz. of Malta is = 611 lb. or oz. troy. According to the rate of coinage, the double Louis-d'or is to weigh $\frac{23}{36}$ of an oz. of Malta, or $260\frac{1}{2}$ Engliſh grains; and the gold is to be $20\frac{1}{2}$ carats fine. The ounce or piece of 30 tari is to weigh $1\frac{1}{3}$ oz. of Malta, or $458\frac{1}{4}$ Engliſh grains, and the ſilver is to be 10 carats (or $\frac{10}{12}$ths) fine. The ſcudi and inferior ſilver coins are almoſt 9 carats, fine. The ſingle Louis-d'or is worth 19*s.* 8*d.* ſterling; the piece of 30 tari, or $2\frac{1}{2}$ ſcudi, is worth $53\frac{1}{3}$*d.* Thus the ſcudo current money is worth $21\frac{1}{3}$*d.* ſterling.

The commercial weights are the heavy and the light cantaro; the former conſiſting of 111 heavy rottoli, each of $2\frac{3}{4}$lb.; the latter of 100 light rottoli, each of $2\frac{1}{2}$ lb. The heavy cantaro is = 213lb. avoirdupois, and the heavy rottolo = $30\frac{1}{2}$ oz. do. The light cantaro = 175lb. avoirdupois; and the light rottolo = 28 oz. do.; 10lb. of Malta = 7lb. avoirdupois.

The meaſures are a ſalma of corn, nearly equal to an Engliſh quarter, or 64 ſalma = 63 Engliſh quarters: the caffiſo, a meaſure for oil, contains $5\frac{1}{2}$ Engliſh gallons. The canna, a long meaſure, is divided into 8 palmi, and is $922\frac{1}{2}$ French lines, or $81\frac{9}{10}$ Engliſh inches; hence 40 canna = 91 Engliſh yards. The foot of Malta is $11\frac{1}{6}$ Engliſh inches, and 72 feet of Malta = 67 Engliſh feet. The Sicilian weights and meaſures are likewiſe uſed here, for which ſee SICILY.

In 1808 the Sicilian dollar of $2\frac{1}{2}$ ſcudi or 30 tari was exchanged for $56\frac{1}{4}$ pence ſterling, in government bills in England at 30 days ſight. Kelly's Univerſal Cambiſt, vol. i. N. lat. 35° 42'. E. long. 14° 10'.

MALTA, a town of America, in Saratoga county, New York, taken from the weſtern part of Stillwater; four miles E. of Ballſtown ſprings.

MALTA, *Knights of*, an order of military religious, who have borne various other names; as Hoſpitalers of St. John of Jeruſalem, knights of St. John, knights of Rhodes, order of Malta, religion of Malta, &c.

About the year 1048, ſome Neapolitan merchants founded a church after the Latin rite at Jeruſalem, giving it the name of Santa Maria della Latina, or St. Mary of the Latins. They alſo founded a monaſtery of religious after the order of St. Bennet, for the reception of pilgrims; and afterwards an hoſpital near the monaſtery, to take care of the diſeaſed, under the direction of a maſter or rector, to be nominated by the abbot of Santa Maria della Latina. Beſides which, they alſo built a chapel in honour of St. John Baptiſt.

In 1099, Godfrey of Bulloign, having taken Jeruſalem, endowed this hoſpital with ſome demeſnes, which he had in France; and others imitating his liberality, the revenues of the hoſpital became conſiderably augmented. Upon this, Gerhard de Didier, a native of Provence, their rector, in concert with the Hoſpitalers, reſolved to ſeparate from the abbot and religious of Santa Maria, and to form a diſtinct congregation, under the name and protection of St. John Baptiſt: and hence it was that they had the name of "Hoſpitalers, or Brothers of St. John of Jeruſalem." Their habit was black; and they wore on their breaſts a white croſs of eight points, in token of the eight beatitudes.

Pope Paſcal II. by a bull in the year 1113, confirmed the donations made to this hoſpital, which he ſettled under the protection of the holy ſee; ordering, that the rectors, after Gerhard's death, ſhould be choſen by the Hoſpitalers. Raymond du Puy, Gerhard's ſucceſſor, took the title of "maſter;" and he gave a rule to the Hoſpitalers, which was approved by pope Calixtus II. in 1120. Such was the firſt riſe of the order of Malta.

Their firſt grand-maſter, finding the revenues of the hoſpital vaſtly to exceed what was neceſſary for the entertainment of poor pilgrims, and diſeaſed perſons, reſolved to employ the ſurplus againſt the infidels; and with this view he offered himſelf to the king of Jeruſalem.

He divided his Hoſpitalers into three claſſes; the firſt conſiſted of nobles, whom he deſtined to the profeſſion of arms, for the defence of the faith, and the protection of pilgrims; the ſecond conſiſted of prieſts or chaplains, who were to ſay maſs; and the third of ſervitors, who were not noble, but were alſo appointed for the war. He alſo regulated the manner of admitting knights brothers; and had the whole confirmed in 1130, by pope Innocent II. who commanded that the ſtandard of the knights ſhould be "gules, a full croſs argent."

After the loſs of Jeruſalem, they retired firſt to Margath, then to Acre, which they defended very vigorouſly in 1290. After the entire loſs of the Holy Land they withdrew to Cyprus, where king Henry of Luſignan, whom they had followed thither, gave them the city of Limiſſon. Here they continued eighteen years, when, taking the iſland of Rhodes from the Saracens in 1308, they ſettled there. And now it was that they firſt took the name of "knights," and ſoon after "knights of Rhodes."

Andronicus, emperor of Conſtantinople, granted to their grand maſter, Fulk de Villaret, the inveſtiture of this order, and the donation was confirmed by pope Clement. The year following, with the aſſiſtance of Amadeus IV. duke of Savoy, they defended themſelves, and their iſland againſt an army of Saracens. In 1480, their grand maſter d'Aubuſſon made a vigorous defence againſt Mahomet II. and preſerved the iſland in ſpite of a formidable army, which beſieged it for the ſpace of three months. But in 1522, it was attacked by Solyman II. with an army of 300,000 men, and taken by him, after having been in the poſſeſſion of the knights 213 years.

After this loſs, the grand maſter and knights retired firſt into the iſle of Candia. Some time after pope Clement VII. gave them Viterbo. Laſtly, Charles V. in 1525, gave them the iſland of Malta, which grant was confirmed by the pope in 1530: and hence they obtained the appellation of "knights of Malta;" though their proper name is that of "knights of the order of St. John of Jeruſalem;" and their grand maſter among his other titles, ſtill retains that of "maſter of the hoſpital of St. John," and "guardian of the poor of our Saviour Jeſus Chriſt." The badge of the order is a "gold croſs of eight points enamelled white, and worn by all the knights at their breaſt, pendant to a black ribbon." The knights of this order, whether novices or profeſſed, when they go to war with the Turks, wear over their coats "a red jacket or tabard, charged both before and behind with a great full white croſs, without points." See the preceding article.

The order of Malta have no other dominions beſides their iſland, and ſome other little places in the neighbourhood, the chief whereof are Gozo and Comino.

The government is both monarchical and ariſtocratical, the grand maſter being the ſovereign, and the chapter the ſenate. It is monarchical with regard to the inhabitants of Malta, and the iſles adjacent, and even with regard to the knights in every thing relating to the ſtatutes and rules of their

their order; and it is ariſtocratical with regard to the deciſion of any important affairs, which are not to be diſpatched but by the grand maſter and the chapter. There are two councils; the one ordinary, compoſed of the grand maſter, as chief, and the grand croſſes; the other complete, conſiſting of the grand maſter, the grand croſſes, and the two ſenior knights of each language.

By the languages of Malta are meant the ſeveral nations of which the order is compoſed. Of theſe, authors have reckoned eight, *viz*. Provence, Auvergne, France, Italy, Arragon, Germany, Caſtile, and England.

The pillar (as he has been called) of the language of Provence is the grand commander of the order; he of Auvergne the grand marſhal; he of France the grand hoſpitaler; he of Italy the grand admiral; he of Arragon grand conſervator, or draper, as he was anciently called; the pillar of the language of Germany is grand bailiff; and he of Caſtile grand chancellor; the language of England, which has been extinct ſince the time of the Reformation under king Henry VIII. had for its pillar or chief, the grand turcopolier, or colonel of the cavalry. The language of Provence is the firſt, on account of Gerhard, a native of Provence, or of Raimond du Puy, their firſt grand maſter, who was a Provençal.

In each language there are ſeveral grand priories, and capital bailiages. To each language belongs a hall, where the knights eat, and hold their ordinary aſſemblies. Each grand prior has a number of commanderies.

The commanderies are either magiſterial, or elſe by right, or, finally, by favour. The magiſterial are thoſe annexed to the grand maſterſhip, of which there is one in each grand priory: commanderies by right are thoſe which come by right of ſeniority; their ſeniority is computed from the time of their admiſſion; but they muſt firſt have lived five years at Malta, and have made four caravannes, or cruiſing voyages, on the Turks and Corſairs: commanderies by favour are thoſe which the grand maſter, or the grand prior, have a right of conferring; one of theſe they confer every five years on whom they pleaſe. The noble knights are called knights by right; and none but theſe can be bailiffs, grand priors, or grand maſters. Knights by favour are thoſe who, not being noble of themſelves, are raiſed on account of ſome great exploit, or ſome notable ſervice, into the rank of nobles.

The ſervitors, or ſerving-brothers, are of two kinds: 1. The ſervitors of war, whoſe functions are the ſame with thoſe of the knights. 2. The ſervitors of religion, whoſe whole buſineſs is to ſing the praiſes of God in the conventual church, and to officiate each in his turn as chaplain on board the veſſels and gallies of the order.

The brothers of obedience are prieſts, who, without being obliged to go to Malta, take the habit of the order, make the vows, and attach themſelves to the ſervice of ſome of the churches of the order, under the command of a grand prior, or commander, to whom they pay obedience.

The knights of majority are thoſe who, according to the ſtatutes, are admitted at ſixteen years of age. The knights of minority are thoſe who are admitted from the time of their birth; which, however, cannot be done, without a diſpenſation from the pope.

The chaplains can only be admitted regularly from ten to fifteen years of age: after fifteen they muſt have a brief from the pope; till fifteen, the grand maſter's letter is ſufficient. Theſe are called *diacos*, and muſt give proof of their being born of creditable families.

For the proofs of nobility to be made before the admiſſion of knights, in the language of Germany, they go back ſix generations; in the reſt, it is ſufficient to go back to the great grandfather on the father's or mother's ſide.

There are alſo female hoſpitalers of the order of St. John of Jeruſalem, ſometimes alſo called *chevalier eſſes*, or *ſhe-knights*, whoſe buſineſs was to take care of the women-pilgrims, in an hoſpital apart from that of the men. This order was inſtituted in the year 1107, by Agnes, abbeſs of the hoſpital of St. Mary Magdalene, who, with her companions, made profeſſion of the ſame rule, took the ſame habit, and bound themſelves to obſerve the ſame vows, as Gerhard de Didier had done in the year 1099. The badge of this order was the ſame with that of the knights of Malta.

Since treaties of alliance between Chriſtian and Infidel powers are now as common as between Chriſtian powers alone; and ſince the Barbary Corſairs are leſs formidable and injurious to commerce than they were formerly, the order of Malta, notwithſtanding its claim to the gratitude of European powers for a long, long ſeries of paſt ſervices, ſeems to have declined in importance and eſtimation.

Under the grand maſterſhip of Rohan, indeed, the poſſeſſions belonging to the order of St. Anthony were added to thoſe of Malta; ſeveral commanderies, ſituated in Poland, were reſtored; and a new language was inſtalled, the Anglo-Bavarian; to which was afterwards united the grand priory of Ruſſia, created by the emperor Paul, who, enamoured of chivalrous exploits, and well aware of the commercial and political advantages which Ruſſia would derive from the poſſeſſion of Malta, aſſumed the title of protector of the order, and was inveſted, together with the whole imperial family, with the grand croſs of Malta.

Nevertheleſs, the European powers were very indifferent as to the independence of the order.

That the legiſlative aſſembly of France ſhould paſs a decree, annulling the order of Malta, was not matter of ſurpriſe: it was the natural conſequence of a previous law, that every Frenchman, who was a member of any order of knighthood which required proofs of nobility, ſhould no longer be regarded as a French citizen. Nor can it be matter of ſurpriſe that, by the ſame decree (Sept. 19, 1792), all its property ſhould be annexed to the demeſnes of France. The original hoſpitalers, and the firſt knights were Frenchmen; out of the eight languages France had three, beſides commanderies ſituated in Alſace, Rouſillon, and French Navarre, which were all dependencies of the two languages of Germany and Arragon. The confiſcation of all this property was quite conſonant with the prevaling atrocious ſyſtem of revolutionary policy and morals. The enormous deficit which this plunder occaſioned, ought to have excited the compaſſion, if it had not called forth the generoſity, of other ſtates; inſtead of which we find the order aſſeſſed to ſupport the coalition againſt France. Thus, between two armies, the knights of Malta bear the blows of both! The Spaniſh and Portugueſe commanderies, which had never before paid any taxes to their reſpective governments, were now called upon for a tenth of their revenue; thoſe in the kingdom of Naples and in Sicily were ſubjected to heavier ones; and the order was treated ſtill worſe in Piedmont, where part of the property of the knights of Malta was ordered to be ſold.

The revenue of the order in the year 1788 amounted to 3,156,719 French livres, and the expenditure to 2,967,503, leaving a ſurplus of 189,216. To the confiſcation of its property in France, yielding an annual revenue of 1,392,974 livres, and its taxation by different ſovereigns in ſupport of the war againſt France, muſt be added the enormous loſs which the treaſury ſuſtained by the depreciation of paper money, when it became neceſſary to realize the revenues due

due from Spain and part of Italy. The left bank of the Rhine being ceded to the French by the treaty of Campo Formio, the order was deprived of all its property in these four new departments; and the different new republics, formed on every side, successively robbed it of what it possessed in Helvetia, and the Ligurian and Cisalpine republics. Malta, by these accumulated losses, was deprived of two-thirds of its revenue. It was compelled to borrow to the amount of six millions of livres; and at last its credit was fallen so low, that no one could be found to advance more. In the year 1796, the plate belonging to the men of war and to the gallies was melted down, and coined into money, as was also part of the grand master's, together with some of that employed for the use of the sick in the hospital. It was very evident, therefore, that this noble order, which for seven hundred years had been the terror of infidels and the bulwark of Christendom, was no longer held in that estimation and respect by the European potentates, which the remembrance of its valorous achievements might have been expected to inspire. Russia, under Paul I., certainly manifested a desire to afford Malta relief: the order also expected the payment of about a hundred thousand crowns from Spain, which most unfortunately did not arrive till a few days after the French had landed in the island, and which, of course, became a prey to them.

Notwithstanding the low state of the finances, Malta, at the time the French fleet made its appearance, was perfectly able to have made a formidable resistance against any attempt at landing; and if a landing had been effected, a still more powerful defence of the city Valetta. "Never to reckon the number of the enemy" made a part of the oath of every knight, on his admission into the order; and "to die at his post was a first principle of honour." The bulwarks of the island were master-pieces of fortification, and if the knights and the Maltese had been as faithful to themselves and to each other as at the siege by Solyman, Bonaparte would have retired from this rock of resistance abashed, confounded, and defeated. The treacherous surrender of the island gives an ample verification to the statement of the Maltese deputies: "The defection," say they, "and treason of which the order was guilty, will form an epoch in the annals of the world as striking as that by which we are again thrown under its despotic dominion, after it had abandoned us to an army unfaithful to all its promises and engagements."—"No one is ignorant that the plan of the invasion of Malta was projected in Paris, and confided to the principal knights of the order, resident at Malta. Letters in cyphers were incessantly passing and re-passing, without, however, alarming the suspicions of the deceased grand master de Rohan, or of the grand-master Hompesch." On the evening of the 9th of June, 1798, the French landed their troops at Magdalen creek, and on their approach "one single cannon shot" was fired from fort St. George! At day-break their shallops were seen advancing towards seven different points, Gozo, Cumino, La Mallcha, Salmon, St. George, St Julian, and La Trombrella, none of which made any resistance, except Goza, which was attacked by general Regnier, and defended by the commander de Megrjny. A dreadful scene of slaughter ensued: the Maltese people fought with a two-edged sword; they attacked the invaders with valour, and slew, without discrimination, the knights of the order, by whose treachery they had been suffered to effect a landing. That some among the Maltese were deluded by the promises universally lavished by the French, of liberty, equality, &c. cannot be doubted; but by their subsequent conduct it is fully proved, that the bulk of the people were most determinedly hostile to the admission of the French, and that their detestation of the order was inexpressibly increased by a detection of its treachery on this occasion. When Bonaparte set sail, some of the knights actually enlisted under his banners!

It is unnecessary to give an account of the conduct of the French on their possession of Malta: every thing in the public buildings, "which bore the stamp of nobility, or recalled to mind the celebrated exploits performed by illustrious chiefs, was broken and destroyed." The arms of the order, together with those of the principal chiefs, were effaced not only in the principal inns, but in the palace of the grand master, himself being present on the occasion! The knights who were not in the French interest, were ordered to quit the island in three days, and a disgraceful salary was voted to Hompesch, as an equivalent for the property annexed to the grand mastership. The knights who were attached to the French interest had but little reason to applaud the wisdom of their political speculations: exposed to the rage of the Maltese, and unprotected by their new friends, they were shut up in different fortresses, some fled, some absolutely perished from want, and all were despised and hated.

They who remained faithful to their duty were scattered in different places. Hompesch retired to Trieste, separated himself from the companions of his flight, and resigned the office of grand master, which he had so ingloriously filled. Many retired to the dominions of the emperor of Russia, who took upon himself the title of grand master, and created a new Russian priory for the benefit of the nobles in his dominions, who followed the rites of the Greek church.

Notwithstanding the flight of Hompesch, and the knights who accompanied him, and notwithstanding the treachery of those apostate members of the order who remained behind, attached to the provisional government established in the island by the French, the brave inhabitants rose in arms against their invaders, who were shut up within the gates of Valetta, without daring to issue forth and face the terrible vengeance of the people. The blockade of Malta by the English lasted two years; namely, from September 2, 1798, to September 4, 1800, when the city surrendered. The situation of the city was so deplorable from the alarming mortality among the troops and inhabitants, arising doubtless from the scarcity of provisions, that a surrender appeared absolutely certain. In September, 1799, a fowl, which before the blockade, used to sell for *6d* sold for from *2l. 3s.* to *2l. 10s.* English; a pigeon was worth *10s.*; a rabbit about the same; a *rat* from *1s.* to *1s. 6d.*; fresh pork sold for *7s.* a pound, and cheese for the same. The flesh of mules and asses was in such request, that the people complained bitterly whenever they were deprived of it. The French, however, raised vegetables, bred poultry, rabbits, &c.; and, under the vigilance and unceasing encouragement of their general Vaubois, contrived, as much as possible, to relieve their wants and support their spirits. The garrison was put upon half-pay in the month of August; in the following December it was entirely stopped, as was their allowance of wine and brandy. To the honour of the French troops, for it is impossible to contemplate such conduct without admiration, not a murmur was heard, and during a whole twelve-month there were scarcely twenty deserters, and the greatest of these were either volunteers or sailors! The situation of the inhabitants now became every day more and more disastrous; and such were the effects of poverty, disease, and frequent emigration, that of 40,000 souls in September 1798, there only remained 13,000 in 1799: these were reduced to 10,000 in the following October, and to 7500 in March 1800. In the last period

period of the blockade provisions rose to an incredible price: a bottle of oil sold for a guinea, a pound of coffee for 2*l.* 8*s.* and a pound of sugar for a few shillings less; asses, mules, horses, dogs, and cats, were almost all consumed; and general Vaubois was at last compelled, by famine, to propose terms of capitulation. He received from the English such as were due to so persevering and courageous a resistance, and such at the same time as proved that Britons pay just homage to the bravery of an enemy. The native Maltese were the only party who had reason to complain of the capitulation, and still greater of the treaty of Amiens, which again consigned them to the order which had given such irrefragable proofs of cowardice and treachery.

By the treaty of peace between Great Britain and the French republic, concluded at Amiens 27th March 1802, it was stipulated, that the islands of Malta, Gozo, and Cumino, should be restored to the order of St. John of Jerusalem, to be held on the same conditions on which it possessed them before the war, and under the following stipulations. 1. The knights of the order, whose languages shall continue to subsist after the exchange of the ratification of the present treaty, are invited to return to Malta as soon as the exchange shall have taken place. They will there form a general chapter, and proceed to the election of a grand master, chosen from among the natives of the nation which preserve their language, *i. e.* a right of election, as belonging to a particular Catholic nation, unless that election has been already made since the exchange of the preliminaries. It is understood that an election made subsequent to that epoch, shall alone be considered valid, to the exclusion of any other that may have taken place at any period prior to that epoch. 2. The governments of the French republic, and of Great Britain, desirous to place the island and order of Malta in a state of entire independence with respect to them, agree that there shall not in future be either a French or English language, and that no individual belonging to either the one or the other of these powers shall be admitted into the order. 3. There shall be established a Maltese language which shall be supported by the territorial revenues and commercial duties of the island. This language shall have its peculiar dignities, an establishment, and an hotel. Proofs of nobility shall not be necessary for the admission of knights of this language; and they shall be moreover admissible into all offices, and shall enjoy all privileges, in the same manner as the knights of other languages. At least half of the municipal administration, civil, judicial, and other employments depending on the government, shall be filled by inhabitants of the islands of Malta, Gozo, and Cumino. 4. The forces of his Britannic majesty shall evacuate the island and its dependencies, within three months from the exchange of the ratifications, or sooner if possible. At that epoch it shall be given up to the order in its present state, provided the grand master or commissaries, fully authorized according to the statutes of the order, shall be in the island to take possession; and that the force which is to be provided by his Sicilian majesty, as is hereafter stipulated, shall have arrived there. 5. One-half of the garrison at least shall be always composed of native Maltese; for the remainder the order may levy recruits in those countries only which continue to possess the languages. The Maltese troops shall have Maltese officers. The command in chief of the garrison, as well as the nomination of the officers, shall pertain to the grand master; and this right he cannot resign, even temporally, except in favour of a knight, and in concurrence with the advice of the council of the order. 6. The independence of the isles of Malta, Gozo, and Cumino, as well as the present arrangement, shall be placed under the protection and guarantee of France, Great Britain, Austria, Spain, Russia, and Prussia. 7. The neutrality of the order, and of the island of Malta, with its dependencies, is proclaimed. 8. The ports of Malta shall be opened to the commerce and navigation of all nations, who shall there pay equal and moderate duties; those duties shall be applied to the cultivation of the Maltese language, as specified in paragraph 3; to that of the civil and military establishments of the island; as well as to that of a general lazaretto, open to all ensigns. 9. The states of Barbary are excepted from the conditions of the preceding paragraphs, until, by means of an arrangement to be procured by the contracting parties, the system of hostilities which subsists between the states of Barbary and the order of St. John, or the powers possessing the languages, or concurring in the composition of the order, shall have ceased. 10. The order shall be governed, both with respect to spirituals and temporals, by the same statutes which were in force when the knights left the isle, as far as the present treaty shall not derogate from them. 11. The regulations contained in the paragraphs 3, 5, 7, 8 and 10, shall be converted into laws and perpetual statutes of the order, in the customary manner: and the grand master (or if he shall not be in the island at the time of its restoration to the order, his representative), as well as his successors, shall be bound to take an oath for their punctual observance. 12. His Sicilian majesty shall be invited to furnish 2000 men, natives of his states, to serve in garrison of the different fortresses of the said islands. That force shall remain one year, to bear date from the restitution of the knights; and if, at the expiration of this term, the order should not have raised a force sufficient, in the judgment of the guaranteeing powers, to garrison the island and its dependencies, such as is specified in the paragraph, the Neapolitan troops shall continue there until they shall be replaced by a force deemed sufficient by the said powers. 13 The different powers designated in the sixth paragraph, *viz.* France, Great Britain, Austria, Spain, Russia, and Prussia, shall be invited to accede to the present stipulations.

The Maltese remonstrated in spirited and indignant terms against that portion of the treaty of Amiens which consigned their island to the order: and demanded that it might be restored to them; or that the expences they had incurred might be paid to them, or that they might be indemnified for the losses occasioned by the war, and by the plunder of the French. They then contest the title of the knights to the possession of the island, and placing, as they state their case, a full reliance in the sincerity of the British government, and in the faith of the British nation, the Maltese were more desirous of becoming subjects of the king of England, and of enjoying all the advantages of free subjects of a monarch, who is the father of all his people, than to assert and maintain their own independence; but never did they suspect, nor can they now for a moment believe, that, violating all the laws of justice, divine and human, they are to be forcibly delivered up by their auxiliary allies, as a conquered people, or as vile slaves sold for a political consideration to other masters, to masters, "whose tyranny, extortion, and sacrilege, have rendered them the execration of every virtuous mind, and to whom, whatever horrible calamity may ensue, the Maltese nation will never submit." The representation proceeds to assert, that if the island were again delivered up to the order, it would virtually be in the hands of the French, since they are not (even including those of the new Anglo-Bavarian language), more than a *thirtieth* part of the knights who are not at the blind disposal of France. Indignantly is it observed, "if the knights of the order, in possession of an independent sovereignty and revenue, enjoying every ease and pleasure that imagination can form, engaged in objects of luxury, careſſed and reverenced as ſo many ſovereigns; if in this condition the French could command them to quit their terreſtrial paradiſe, to wander in the wide world, and could induce them to become partiſans of their cauſe, what muſt not the power of the ſame French over them be, dependent, degraded, diſhonoured, reduced to beggary, in whom is extinct every ſpark of honour, and who have been guilty of the blackeſt, the moſt horrible infidelity, apoſtacy towards their God, and violation of the ſacramental ordinances?"—"With reſpect to the guarantee of this or that power, but too well is our iſland acquainted with the French and the order, not to be convinced of the fallibility of ſuch a propoſition. The firſt war, whether of length or ſhort duration, puts an end to it entirely. If ever a third power were to occupy ſome parts of the fortreſſes, the troops would be corrupted by French money and French principles; and immenſe are the ſums that would be expended for that purpoſe. The military poſts are dependent one upon the other. We are able to point out," ſay the repreſentatives, "the utter impoſſibility of occupying a part, without the whole. We can clearly demonſtrate how they can, and will obtain their ſeveral ends. We can make it evident, that there is no ſecurity for the inhabitants, unleſs Britiſh troops are placed in poſſeſſion of all the fortreſſes, and unleſs the adminiſtration of juſtice is placed in the hands of a Britiſh civil government." Boiſgelin's Anc. and Mod. Malta.

MALTA, or *Medina*. See CIVITA *Vecchia*, and MALTA, *ſupra*.

MALTA *Earth*, in the *Materia Medica*. See MELITENSIS *terra*.

MALTEPEC, in *Geography*, a town of Mexico, in the province of Mechoacan; 60 miles E.S.E. of Mechoacan.

MALTESE, in *Biography*. The proper name, the birthplace, and the education of the ingenious painter who bears this appellation, are alike unknown; but his works, which conſiſt chiefly of objects in ſtill life, are valued for their exhibition of freedom, boldneſs, and truth. They are generally compoſed of fruit, carpets, jewellery, ſhells, tapeſtries, &c. to which, by a judicious management in their compoſition, a brilliant colour, and a ready and powerful touch, he produced a ſtrong and brilliant relief; and often a moſt enchanting effect of chiaro-oſcuro.

MALTHA, Μαλθα, in *Antiquity*, denotes any cement, or glutinous body, which has the faculty of binding things together. See *Calcareous* CEMENT.

Ancient writers make mention of divers ſorts of maltha, native and factitious; one of the latter much in uſe was compoſed of pitch, wax, plaſter, and greaſe.

Another kind, with which the Romans plaſtered and whitened the inſides of their aqueducts, was made of lime ſlaked in wine, incorporated with melted pitch, and freſh figs.

Natural maltha is a kind of bitumen, called "mineral pitch," with which the Aſiatics plaſter their walls. When this is once ſet on fire, water will not quench it; but ſerves rather to make it burn more fiercely. See BITUMEN.

MALTHA, in *Ichthyology*, the name of a voracious fiſh of the ſhark kind, called the *ſorrat*, and the *lamiola* by ſome authors, a diminutive of *lamia*, ſignifying a ſmall ſhark. Its teeth are broad and pointed, like thoſe of the ſhark; the fiſh has alſo many rows of theſe; the noſe is ſhort, and its fleſh lax and ſoft. See SQUALUS.

MALTHOCODE, a term by which the Greek writers expreſs the emollient topical remedies prepared with oil. Hippocrates expreſsly forbids the uſe of theſe in old ulcers.

MALTON, or NEW MALTON, in *Geography*, a borough and market-town in the wapentake of Ryedale, North Riding of the county of York, England, is ſituated 18 miles diſtant from York, and 217 from London, on an eminence overlooking the river Derwent, which runs through a beautiful vale on the ſouth-eaſt ſide of the town. Malton was of ſome note in the Saxon times. Immediately before the Norman conqueſt, it was poſſeſſed by a nobleman named Colebrand, from whom it was taken by the Conqueror, who gave it to Gilbert Tyſon, one of his followers. In the reign of Henry I., Euſtace St. John poſſeſſed this lordſhip by inheritance from his mother, who was grand-daughter and heireſs of Gilbert Tyſon. In the conteſt between the empreſs Maud and king Stephen, the town was reduced to aſhes. It was rebuilt by Euſtace, and then acquired the name of New Malton. In the reign of James I., Ralph, lord Eure, who was then in poſſeſſion of the manor, built a magnificent houſe here: but leaving no iſſue, his eſtates came to his uncle William, lord Eure, who left two daughters, coheireſſes. Theſe diſagreeing about this noble manſion, it was, after a tedious and expenſive litigation, determined that it ſhould be pulled down, and its materials divided: and ſo ſcrupulouſly was the diviſion made, that the "ſtones were even ſhared one by one." But it ſeems that ſome compromiſe took place before the dilapidation was completed, as the lodge in the front, with three arched gateways, are yet ſtanding. The manor was afterwards conveyed to ſir Thomas Wentworth, and from him deſcended to Thomas, marquis of Rockingham, who was ſucceeded in titles and eſtates by his ſon Charles, the late marquis; after whoſe death, the eſtates devolved on his nephew, earl Fitzwilliam.

Malton is about half a mile in length from eaſt to weſt. The entrance at the eaſt end is by a ſpacious ſtone-bridge over the Derwent, whence the principal ſtreet riſes with a continued, but gentle aſcent through the town. The houſes are moſtly built of ſtone; and in the year 1801 were in number, according to the population ſurvey, 604, and were occupied by 3047 perſons. The town comprizes two pariſhes, St. Michael's and St. Leonard's; each having its reſpective church: the ſpire of the latter has a ſingular appearance. Malton is a borough by preſcription, and has ſent two members to parliament ever ſince the 23d year of Edward I.; the right of election being veſted in the holders of about 100 burgage tenures. The town is governed by a bailiff. Markets are held on Tueſdays and Saturdays; and a briſk trade is carried on in corn, of which a great quantity is ſent into the weſtern parts of Yorkſhire, and to ſeveral other places. The Derwent is navigable to Malton, where the quantity of corn ſhipped in the year 1796 amounted to 56,065 quarters. Here are three annual fairs, which exhibit a great ſhow of horſes and cattle, and are much frequented by farmers, graziers, and horſe-dealers. Hinderwell's Hiſtory of Scarborough. Beauties of England and Wales, vol. xvi. by John Bigland.

MALTOY, a town of Hindooſtan, in Goondwana; 60 miles N.W. of Nagpour. N. lat. 21° 45'. E. long. 78° 58'.

MALTRA, a town of Sweden, in Angermanland; 42 miles N.N.W. of Hernoſand.

MALVA, in *Botany*, is thought by Ambroſinus to have obtained its name from *mollis*, alluding to the ſoothing or emollient qualities with which it is endued. The ancients reckoned it an excellent ſtomachic, frequently mixing it with *Lactuca* in their ſallads. Its Greek name μαλαχη is of ſimilar origin, being derived from μαλασσειν, *to ſoften*. Horace, as every body knows, ſpeaks of "*leves malvæ*," apparently meaning light of digeſtion; and Martial ſays, "Utere lactucis, et mollibus utere malvis." Linn. Gen. 354. Schreb. 466. Willd. Sp. Pl. v. 3. 774. Mart. Mill.

Mill. Dict. v. 3. Sm. Fl. Brit. 740. Ait. Hort. Kew. ed. 1. v. 2. 446. Juff. 272 Lamarck Illuftr. t. 582. Gærtn. t. 136.—Clafs and order, *Monadelphia Polyandria*. Nat. Ord. *Columniferæ*, Linn. *Malvaceæ*, Juff.

Gen. Ch. *Cal.* Perianth double, inferior; the outer generally narrower, of three ovate or heart-fhaped, acute, permanent leaves; the inner of one leaf, five-cleft half way down, larger, broader, permanent. *Cor.* Petals five, obcordate, abrupt, flat, fixed by their bafe to the tube of the ftamens. *Stam.* Filaments numerous, united below into a tube, feparate and loofe at the top, and along the furface; anthers kidney-fhaped. *Pift.* Germen fuperior, orbiculate, depreffed; ftyle cylindrical, fhort; ftigmas many, briftly, as long as the ftyle. *Peric.* Capfule roundifh, compofed of the fame number of two-valved cells as there are ftigmas, placed in a whorl about a columnar receptacle; finally deciduous. *Seeds* folitary, occafionally two or three, kidney-fhaped.

Eff. Ch. Calyx double; the outermoft of three leaves. Capfules numerous, circularly arranged. Seeds moftly folitary.

Obf. Schreber remarks that fome fpecies have only two leaves to the outer calyx, and that in *M. caroliniana* each capfule is divided into two cells by a tranfverfe membrane.

This extenfive genus furnifhes many ornamental plants, though chiefly of exotic growth. We felect the following fpecies to illuftrate its hiftory. Linnæus has defined only twenty-fix in the 14th edition of his *Syftema Vegetabilium*. Profeffor Martyn however has thirty-four, and Willdenow defcribes fifty-five. They are arranged under two fections, namely, fuch as have undivided leaves, and fuch as have angular leaves, all our three native Mallows belonging to the latter fection.

Sect. 1. *Leaves undivided.*

M. *fpicata*. Spiked Mallow. Linn. Sp. Pl. 967. (Althæa fpicata, betonicæ folio villofiffimo; Sloan. Jam. v. 1. 219. t. 138. f. 1.)—Leaves ovate or heart-fhaped, notched, downy. Spikes oblong, hairy.—A native of barren, rocky lands in Jamaica, flowering in September and October. *Stem* two or three feet high, pale green, branched. *Leaves* roundifh, on footftalks, pale green and fmooth. *Flowers* in fpikes at the fummits of the twigs and branches, orange-coloured.

M. *fcoparia*. Small yellow-flowered upright Mallow. Willd. n. 4. L'Herit. Stirp. t. 27. Jacq. Ic. Rar. t. 139.—Leaves ovate, notched or ferrated. Flowers axillary, crowded together. Stem fhrubby.—A native of Peru, difcovered near Lima by Dombey, flowering late in the fummer. The inhabitants of Spanifh America make brooms of its branches, whence the fpecific name. *Stem* about fix feet high, upright, round, fmoothifh, much branched. *Leaves* rather drooping, fomewhat heart-fhaped, acute, entire at the bafe, downy, rugged, pale green. *Flowers* on fhort ftalks, of a yellow colour fpotted with red.

Sect. 2. *Leaves angular.*

M *fylveftris*. Common Mallow. Linn. Sp. Pl. 969. Engl. Bot. t. 671. Curt. Lond. fafc. 2. t. 51. Woodv. Med. Bot. t. 54.—Stem upright, herbaceous. Leaves with feven fharpifh lobes. Leaf-ftalks and flower-ftalks hairy.—By hedges and paths both in cultivated and wafte ground all over England, flowering from May to September.—*Root* perennial, fpindle-fhaped, branched, whitifh. *Stem* generally erect, branched, round, hairy, many-flowered. *Leaves* alternate, on footftalks, heart-fhaped, folded, feven-lobed, roughifh, notched; the upper ones nearly palmate. *Stalks* crowded together, hairy, fingle-flowered. *Flowers* reddifh-purple or lilac-coloured, veined with a deeper tinge; petals obcordate, thrice as long as the *calyx*, which is hifpid. "The whole herb," fays Dr. Smith, "efpecially the root, abounds with a pure mucilage, and poffeffes the emollient qualities of the Marfh Mallow, *Althæa*, though perhaps in an inferior degree. It has, however, the advantage of being much more common, and within every body's reach."

M. *rotundifolia*. Dwarf Mallow. Linn. Sp. Pl. 969. Engl. Bot. t. 1092. Curt. Lond. fafc. 3. t. 43.—Stems proftrate. Leaves roundifh heart-fhaped, five-lobed. Fruit-ftalks bent downwards.—Common in wafte ground, flowering copioufly from June to September. *Root* annual, branched, whitifh, mucilaginous. *Stems* numerous, proftrate, almoft fimple. *Leaves* fmaller than in *fylveftris*, five or feven-lobed. *Flowers* flefh-coloured. A variety of this is fometimes found with fmaller petals, indeed not longer than the calyx. This was confidered as a diftinct fpecies by Mr. Hudfon, who called it *parviflora*, and Dr. Smith figured it in Engl. Bot. t. 241, under the name of *pufilla*, but he afterwards was fatisfied of its being a mere variety of *M. rotundifolia*.

M. *mofchata*. Mufk Mallow. Linn. Sp. Pl. 971. Engl. Bot. t. 754. Curt. Lond. fafc. 4. t. 50.—Radical leaves kidney-fhaped, cut; thofe on the ftem in five deep pinnatifid and finely divided fegments. Calyx hairy.—Not uncommon by the fides of fields and roads in a gravelly foil, flowering in July and Auguft. *Root* perennial, fomewhat woody, tenacious. *Stems* erect, rather branched. *Lower leaves* heart or kidney-fhaped, lobed; *upper* divided to the bafe into five fegments, which are deeply pinnatifid, cut and channelled. *Flowers* large, handfome, rofe-coloured. The whole herb gives out a ftrong, mufky odour, which is fcarcely perceptible, however, in cold or damp weather.

M. *Alcea*, was once reckoned a Britifh fpecies, and Willdenow ftill mentions it as fuch, but without reafon. Some variety of *mofchata*, with broader leaves than ufual, is fuppofed to have been taken for it.

Malva, in *Gardening*, comprehends plants of the herbaceous, annual, biennial, perennial, and fhrubby kinds, of which the fpecies cultivated are, the fpiked mallow (M. fpicata); the American mallow (M. americana); the Peruvian mallow (M. peruviana); the creeping mallow (M. caroliniana); the oriental mallow (M. orientalis); the whorl-flowered mallow (M. verticillata); the curled mallow (M. crifpa); the palmated mallow (M. egyptia); the vervain mallow (M. alcea); the mufk mallow (M. mofchata); and the goofeberry-leaved or cape mallow (M. capenfis).

In the laft or Cape fpecies, there are varieties in which the ftems are thicker and higher, of a brownifh-red colour; the leaves hirfute, broader, with wider fegments, lefs deeply cut, but with the toothlets fharper and ferrate; the whorls of fruit a little larger, and not muricated, and in which the hairs of the leaves and ftem are fimple, not compound; the flowers almoft upright, not drooping or bending downwards.

Method of Culture.—It may be obferved that the ten firft forts are all capable of being raifed from feeds, which, in the hardy kinds, fhould be fown in the fituations where the plants are to grow, in patches of four or five in each, in the fpring or beginning of autumn, covering them to the depth of half an inch. They may likewife be fown upon a bed of fine earth, and be afterwards removed to the places where they are to flower. Thofe which are natives of hot climates fhould be fown in pots, and plunged in a hot-bed.

In the two latter modes, when the plants have attained fome growth, they fhould be removed into their proper fituations, or into other pots, to be afterwards managed according to the difference of the kinds.

And

And the laſt ſort and varieties may be raiſed alſo by ſeed, which ſhould be ſown upon a hot-bed, or in pots, and plunged in it. When the plants have attained ſome growth, they ſhould be removed into ſeparate pots, replunging them in the hot-bed till freſh rooted, when they ſhould be gradually inured to the full air, managing them afterwards in the ſame manner as other exotics of the green-houſe kind.

The hardy ſorts afford a pleaſing variety in the ſhrubbery and other parts, while thoſe of the more tender and ſhrubby kind produce a good effect in the green-houſe, and among potted collections in other places.

Malva *Arborea*, in *Botany*. See Hibiscus and Lavatera.

Malva *Roſea*. See Alcea and Hibiscus.

Malva *Sylveſtris*. *Common Mallow*, in the *Materia Medica*, has a ſtrong affinity to the althæa or marſh mallow, both in a botanical and in a medicinal reſpect; but the roots of the malva are uſeleſs, while thoſe of althæa are of greater efficacy than any other part of the plant. Accordingly we find, that only the leaves and the flowers of the former are directed by the college for pharmaceutical purpoſes. Formerly the malva was admitted among the more common articles of diet. To this purpoſe it is referred to by Horace, l. i. od. 31.

" ——— Me paſcunt olivæ
Me cichorea leveſque malvæ."

The Chineſe are ſaid to eat the leaves of mallow, either raw as ſallad, or boiled as ſpinach. As to the medicinal qualities of this plant, we ſhall refer to the article Althæa; obſerving, that the leaves afford a ſimilar glutinous juice, which is fitted to anſwer the ſame purpoſes as thoſe of marſhmallow, and are therefore principally uſed in fomentations, cataplaſms, and emollient enemas; but the internal uſe of theſe leaves ſeems to be wholly ſuperſeded by the radix althææ. Cicero (Epiſt. lib. vii. ep. 26.) mentions the laxative quality of this plant. Woodv. Med. Bot.

Malva, in *Ancient Geography*, a large and deep river of Africa, in Mauritania Cæſarienſis, which runs into the Mediterranean.

MALVACEÆ, in *Botany*, a natural order of plants, the 74th in Juſſieu's ſyſtem, or the 14th of his 13th claſs, equivalent to the *Columniferæ* of Linnæus, which article the reader will find in its proper place.

MALVANA, in *Geography*, a town of the iſland of Ceylon; 12 miles E. of Columbo.

MALVASIA, a town of European Turkey, ſituated on a promontory, almoſt ſurrounded by the ſea, on the eaſtern coaſt of the Morea: its harbour is good, but not large. It is the ſee of a Greek archbiſhop, and one of the ſtrongeſt towns in the Morea: the territory belonging to it is about three miles in circuit, and furniſhes, in part, thoſe celebrated vines, from which was obtained the wine, formerly much valued, under the name of Malmſey. This was formerly a place of great reſort for the worſhip of Eſculapius, which was brought hither by the inhabitants of *Epidaurus* (which ſee). This place is called by the Turks "Menewtſche;" and it is diſtant about a league from the ruins of Epidaurus *Limera* (which ſee), and 40 miles E.S.E. of Miſitra. N. lat. 36° 52′. E. long. 23° 4′.

MALVAVISCUS, in *Botany*, ſo called by Dillenius in his *Hortus Elthamenſis*, v. 2. 210. t. 170. f. 208. Linnæus however conſidered it as a ſpecies of *Hibiſcus*, and gave it the name of *H. Malvaviſcus*, Linn. Sp. Pl. 978. It is now the *Achania* of Banks and Solander, and is characteriſed by a convoluted corolla, ten ſtigmas, and a pulpy fruit. (See Hibiscus and Achania.) *Malvaviſcus* of Gærtner, t. 135, is *Hibiſcus populneus* of Linnæus, certainly a diſtinct genus from *Hibiſcus*, but the name is untenable.

MALUCA, in *Geography*, a town of Peru, in the dioceſe of Truxillo, on the coaſt; 45 miles N. of Payta. S. lat. 4° 25′.

MALVENTRA, a ſmall iſland near the weſt coaſt of Sardinia.

MALVERN, Great, a village and pariſh in the lower diviſion of the hundred of Perſhore, and county of Worceſter, England, is ſituated on the eaſtern declivity of the Malvern hills, at the diſtance of eight miles from Worceſter, 24 from Cheltenham, and 120 from London. A hermitage, or religious ſociety for ſeculars, was founded here in the time of Edward the Confeſſor, and obtained ſome endowment from that monarch. About the year 1083, Aldewine, the chief of this place, was perſuaded by St. Wolſtan, biſhop of Worceſter, to become a Benedictine monk: upon which he immediately ſet about procuring benefactions for building and maintaining a priory of that order. Giſlebert, then abbot of Weſtminſter, aſſigned ſeveral manors and eſtates to its ſupport, whereby, with the munificence of devotees, the monaſtery was raiſed to great wealth and conſequence. Few veſtiges now remain, except the church, which, at the diſſolution, was purchaſed by the inhabitants, and rendered parochial. This is ſtill a magnificent ſtructure, being 171 feet in length, and 63 in breadth, with an embattled and pinnacled tower, riſing from the centre to the height of 124 feet. The painted glaſs in the windows, repreſenting many ſcenes from Scripture hiſtory, was once the object of univerſal admiration; but, through time and neglect, is now in a mutilated ſtate, though enough is left to afford an idea of its former beauty. Several parts of the choir are ornamented with teſſellated pavement, exhibiting the arms of many ancient and noble families. The tombs and monumental inſcriptions are very numerous, and ſome of them of remote antiquity: the inſcription on Walcher, the ſecond prior of Malvern, which was diſcovered in 1711, is dated 1135. Among the tombs is one of a Saxon knight, with his battle axe and other accoutrements, ſuppoſed to be the only one of this kind in England. Malvern has long been noted for two medicinal ſprings: that called St. Anne's well, about a quarter of a mile from the church, is bituminous, and eſteemed very ſalutary; the other is chalybeate, but is in a great meaſure neglected. Great Malvern, according to the population return in the year 1810, contained 819 inhabitants.

About three miles diſtant is the hamlet of *Little Malvern*, which was once a conſiderable village, but now contains only ſix houſes, inhabited by 34 perſons. A Benedictine priory was founded here, in the year 1171, by two brothers, Joceline and Edred, who were ſucceſſively priors. The church was rebuilt in 1482 by John Alcock, biſhop of Worceſter, but is now in a ruinous ſtate.

Malvern *Hills*, are ſituated in the counties of Worceſter, Glouceſter, and Hereford, but principally on the ſouth-weſt part of the former, making a diſtinct boundary to the rich vale of the Severn, lying to the eaſt, and ſtanding as a frontier between Worceſterſhire and Herefordſhire. This lofty range of hills occupies a ſpace about nine miles in length from north to ſouth, and from one to three miles in breadth. The higheſt parts are thoſe called the Herefordſhire and Worceſterſhire Beacons, about four miles diſtant from each other; the former riſing to the height of 1280 feet, and the latter to 1313 feet above the ſurface of the Severn. On the Herefordſhire Beacon are the remains of an ancient encampment, conſiſting of a double entrenchment; the outermoſt about half a mile in circumference. The

The avenues and paſſes are ſtill to be ſeen, and the greateſt part is in ſine preſervation. The veſtiges of another entrenchment, conſiſting only of a ſingle ditch, appear about a mile and half further to the ſouth; and on the declivity of the Beacon is a cave cut in the rock, about ten feet long, ſix broad, and ſeven high, of rude workmanſhip and unknown origin.

From the Malvern hills iſſue various ſprings, of different qualities, according to the ſubſtances they are impregnated with; but that which has for ſeveral ages been reputed of peculiar medicinal efficacy, and has obtained the name of the Holy-well, riſes about half-way up the eaſt ſide of a hill, nearly mid-way between Great and Little Malvern. The ſource of the ſpring is ſecured by a convenient erection, containing a bath and other accommodations. The diſtrict called Malvern-Chaſe contains about 8000 acres, chiefly in Worceſterſhire; only about 700 being in the two adjoining counties. Ruff's Hiſtory of Cheltenham, 8vo. 1803. Shaw's Tour into the Weſt of England, 8vo.

Malvern *Waters.* See *Malvern* Waters.

MALVINDA, in *Botany*, Indian Mallow, a name of Dillenius for ſome ſpecies of the *Sida* of Linnæus. It is ſtill more exceptionable than *Malvaviſcus*.

MALVISANO, in *Geography*, a town of Italy, in the Breſſan; 13 miles S.S.E. of Breſcia.

MALUNG, a town of Sweden, in Dalecarlia; 55 miles W. of Fahlun.

MALURA, in *Botany*, the Sanſkrit name of the Cratæva marmelos of Linnæus. (See Crateva.) It is alſo called bilwa or bilva by the Hindoos, who reckoned it a ſacred ſhrub and fruit eſpecially dedicated to Siva, probably becauſe the latter is of a conical form, cones being typical of Siva, as the perſonification of fire. Many ſuperſtitious practices, and apparently idle tales, are connected with this fruit, in the mythological uſages and legends of the Eaſt Indies. Chaplets of bilwa flowers decorate the ſtatues of Siva, but of no other deity, nor are they offered in ſacrifices to any other. A pious Hindoo ſeeing any of theſe flowers fallen on the ground, would, it is ſaid, reverently remove them to a temple of Siva. The Hindoo poets call it Sriphul, the flower of Sri, or Lakſhmi, the goddeſs of abundance; who is fabled to have beſtowed it on mankind, at the requeſt of Iſwara, or Siva. (See Lakshmi.) The fruit is warm, cathartic, of delicious taſte, and exquiſite fragrance, and of valuable aperient and deterſive qualities. The mucus of its ſeed is uſed as a cement. See Aſiatic Reſearches, vol. ii.

MALUS, the ancient Latin name of an apple-tree, derived from the Greek μηλεα, is retained generically by Juſſieu, Gen. 334, after Tournefort, t. 406, to diſtinguiſh the apple from the pear, merely becauſe the fruit of the former is umbilicated at its baſe, and the ſtyles united at their lower part. The latter character is the moſt material, and appears to be founded in truth; but ſurely theſe plants form one natural genus. See Pyrus.

Malus *Aſſyria*, one of the many names given by the ancients to the citron: they alſo call it *malus Medica*, and by ſeveral other names, as theſe were expreſſive of the country whence they had the fruit. See Citrus and Citreæ *Menſæ*.

Malus *Americana*. See Cactus, Crateva, and Hippomane.

Malus *Armeniaca*. See Prunus.

Malus *Aurantia*. See Citrus.

Malus *Indica*. See Rhamnus *Jujuba*.

Malus *Limonia*. See Citrus.

Malus *Perſica*. See Achras, Amygdalus, and Mammea.

Malus *Punica*. See Punica *Granatum*.

MALUTAYA, in *Geography*, a ſmall iſland in the ſea of Mindoro. N. lat. 11° 12′. E. long. 120° 52′.

MALWA, a province or ſoubah of Hindooſtan, one of the moſt extenſive, the moſt elevated, and highly diverſified in Hindooſtan; and belonging to the extenſive empire of the Mahrattas. It is bounded on the N. by Agimere and Agra, on the E. by Allahabad, on the S. by Candeiſh, and on the W. by Guzerat. Ougein is the capital of one Mahratta prince, and Indore of another. It is now ruled in ſovereignty by Dowlut Rao, nephew and ſucceſſor of the late Madaji Sindiah. The noble river Narmada, or Nerbudah, waſhes it on the ſouth, dividing it from the province of Candeiſh. The Chumbul on the N.W. divides it from Ajmeer and Guzerat. On the S.E. it joins the dominions of the raja of Berar, and on the N.E. the Britiſh territories under the government of Bengal. Malwa may be roundly eſtimated at about 350 miles in length, and nearly as much in breadth. This ſoubah is very temperate in reſpect of climate, its capital city, Ougein, nearly centrally ſituated, being juſt within the northern tropic. (See Ougein.) It is well watered, having, beſides numberleſs lakes and ſmaller ſtreams, the rivers Sipera, Kaliſind, Neem, and Narmada flowing through it. It is an elevated region; and is very productive in grain and fruit, including wheat and grapes. Here are ſeveral noble cities and flouriſhing towns, of which Ougein, Gurrah Mandla, Chandery, Bopal, Manduah, Dhar, and Naderbar, may be reckoned the chief. In the Ayeen Akbery, Ougein is ſtated, on the perſonal knowledge of the author of that work, to have contained, when he viſited it in 1596, 360 Hindoo temples. Chandery is deſcribed as having 14,000 ſtone houſes, 384 markets, 360 caravanſerais, and 12,000 moſques. Its military ſtrength is alſo very highly rated. We take this occaſion to correct a typographical error in the article Indra, whence reference is made to this. About the middle of the ſecond column of that article is a ſtop and break at the word Malwa, and a new article commenced with Indra *Malwa*. Theſe two words are to be ſtruck out, and the lines will then run thus— "particularly Ujaini, or Oojein, the capital of Malwa; the hereditary poſſeſſion of the family of Sindia." For further particulars, ſee Mahrattas.

MALWALLY, an iſland in the Eaſt Indian ſea, about 15 miles in circumference, containing two good harbours. N. lat. 7° 0′. E. long. 115° 20′.

MALZIEU, a town of France, in the department of the Lozere, and chief place of a canton, in the diſtrict of Marvejols; five miles N.N.E. of St. Chély. The place contains 1060, and the canton 5742 inhabitants, on a territory of 160 kiliometres, in 10 communes.

MAMADEBAD, or Mamed-abad, a town of Hindooſtan, inhabited by Banians, who carry on a conſiderable traffic in thread and cotton.

MAMADISCH, a town of Ruſſia, in the government of Kazan, on the Viatka; 16 miles N.E. of Kazan. N. lat. 56° 26′. E. long. 50° 30′.

MAMAK, a ſea-port town of Abaſcia, on the Black ſea; 110 miles W. of Iſgaur. N. lat. 43° 26′. E. long. 38° 25′.

MAMA-KATING, a townſhip of America, in Ulſter county, New York, on Delaware river; containing 1631 inhabitants.

MAMAKATUN, a town of Turkiſh Armenia, on the Euphrates; 12 miles N. of Arzingan.

MAMA-

MAMALEGERY, a town of Hindooftan, on the confines of Dindigul ; 60 miles E. of Cochin.

MAMALAKJE, one of the Calaur iflands. S. lat. 6° 40′. E. long. 123° 33′.—Alfo, a clufter of fmall iflands extending about 60 miles in length from N.W. to S.E. and 30 in breadth, in S. lat. 6° 50′. E. long. 121°.

MAMALUKES, Mammelukes, *Mammalucks*, or *Mamlouks*, the name of a dynafty, which reigned a confiderable time in Egypt.

The word comes from מלך, *regere*, *imperare*, the Arabic participle of which is ממלוך, *Mamluc*, which fignifies *fubject*, or one under the dominion of another. Scaliger holds, that the word is Arabic, and that it properly fignifies fomething bought with money ; but others will have it fignify any thing acquired or poffeffed either as prize or purchafe ; and this gives the fenfe of *flave*.

The Mamalukes, or Mamlouks, were originally Turkifh and Circaffian flaves, who were introduced into Egypt, in confequence of an expedition which took place in the year 1227. The Moguls, fword in hand, pillaging, burning, and murdering, without diftinction either of age or fex, reduced the whole country of Sihoun, quite to the Tigris, to a heap of afhes ; and paffing to the north of the Cafpian fea, extended their ravages even into Ruffia and the Cuban. The Tartars, weary of maffacring, had brought back with them a prodigious number of young flaves of both fexes, filling with them their camps and the markets of Afia. The fucceffors of Salah-el-din, or Saladin, fon of Aiûb, who ufurped the title of fultan of Egypt in 1174, and who died in 1193, perceived that, having an opportunity, as Turkmans, of correfponding with the coafts of the Cafpian fea, they might form, at a cheap rate, a body of foldiers of tried courage and remarkable beauty. Accordingly one of them, *viz.* Malek Salah, about the year 1230, purchafed to the number, as Volney fays, of 12,000 of thefe young men, who were Tfcherkaffes (Circaffians), Mingrelians, and Abazans. Thefe he defigned to be his guard and marine ; and by training them up to military exercifes, he foon obtained a body of the handfomeft and beft foldiers in Afia, though at the fame time, as experience foon taught him, the moft mutinous. This foldiery, like the Prætorian bands of Rome, ere long gave laws to their mafter. Malek Salah died in 1149, and was fucceeded by his fon Tûran Shah, who in the following year captured St. Louis, and his army of 20,000 men. On the 1ft of May 1250, the Mamluks depofed and maffacred Tûran Shah, and affigned the fceptre to his ftep-mother, and afterwards to a Bey of the Aiûbite race ; and this event clofed the dynafty of the Aiûbites in Egypt. At this period commenced the dynafty of the Mamluks. The firft fovereigns of this denomination were the "Baharite Mamlouks," who were fo ftyled, from having been originally employed as "mariners" on board the fhips of the fultan of Egypt. Thefe were Turks or Tartars from Kipzak. The firft fovereign of this dynafty was Ezz-ed-din Moaz Ibegh, who began his reign A. D. 1254 ; and terminated it in the fame year by affaffination. Moft of his fucceffors clofed their lives in the fame manner. The laft of the Baharite Mamlouks was Sheban Aferaf, who was the firft fultan who ordered the fherifs, or defcendants of the prophet, to wear a green turban. The next race of Mamlouks was denominated "Borgite Mamlouks :" it was of Circaffian extract, and continued to rule Egypt till the French invafion. This dynafty commenced in 1382 : but under fucceeding fultans of this dynafty the Mamlouk ariftocracy became gradually more and more precarious. From their firft eftablifhment, the effects correfponded with the means. Without any other bond of union than the intereft of the moment, or any public right to authority, but that of conqueft, thefe Mamlouks, or military flaves, had no other rule of conduct and government than the violence of a licentious and infolent foldiery. The firft leader whom they elected, having found employment for their turbulent fpirit in the conqueft of Syria, reigned 17 years ; but the government of his fucceffors was of fhorter duration. The fword, the bow-ftring, or poifon, public murder, or private affaffination, have been the fate of a feries of tyrants, 47 of whom are enumerated in the fpace of 257 years. At length, in 1517, Selim, fultan of the Ottomans, having taken and hanged Tomân Bey, their laft chief, put a period to that dynafty. Selim was contented with abolifhing the "monarchy" of the Mamlouks, but fuffered their "ariftocracy" to retain its former power, on certain conditions ; the chief of which were, an annual tribute, obedience in matters of faith to the mufti of Conftantinople, and the infertion of the name of the Ottoman emperors in the prayer, and on the coin. At the fame time he projected fuch a form of government that the power, being diftributed among the different members of the ftate, fhould preferve fuch an equilibrium as fhould keep them all dependent on himfelf. See Bey.

The Mamlouks, on obtaining the government of Egypt, adopted meafures which feem to fecure to them the poffeffion of the country. The moft efficacious is the precaution they have taken to degrade the military corps of the Arabs and Janizaries. Thefe, and the other Turkifh troops, are only a rabble of artizans and vagabonds, who guard the gates of thofe who pay them, and tremble in the prefence of the Mamlouks, as much as the populace of Cairo. In reality, the whole military force of Egypt confifts in the Mamlouks.

Some hundreds of thefe are difperfed throughout the country, and in the villages, to maintain the authority of their corps, collect the tributes, and improve every opportunity of extortion ; but the main body continually remains at Cairo. From the computation of well-informed perfons, it appears, their number cannot exceed 8500 men, reckoning Beys and Cachefs, common freed-men, and Mamlouks who are ftill flaves. In this number there is a multitude of youth under 20 and 22 years of age.

The moft powerful houfe is that of Ibrahim Bey, who has about 600 Mamlouks. Next to him is Mourad, who has not above 400, but who, by his audacity and prodigality, forms a counterpoife to the infatiable avarice of his rival : the reft of the Beys, to the number of 18 or 20, have each of them from 50 to 200. Befides thefe, there is a great number of Mamlouks who may be called *individual*, who, being fprung from houfes which are extinct, attach themfelves fometimes to one, and fometimes to another, as they find it their intereft, and are always ready to enter into the fervice of the beft bidder. The Mamlouks, therefore, permit the inhabitants of Egypt to be carried only by mules or affes, referving to themfelves the exclufive privilege of riding on horfeback ; and of this they make fufficient ufe ; for whether they are in town or the country, or if they only make a vifit to the next door, they are never feen but on horfeback. Their drefs, as well as the fupport of their dignity, obliges them to this.

Their drefs confifts in a wide fhirt of thin cotton, of a yellowifh colour, over which they wear a fort of gown of Indian linen, or the light ftuffs of Damafcus and Aleppo. This robe, called *antari*, defcends from the neck to the ankles, and folds over the fore-part of the body, towards the hips, where it is faftened by two ftrings. Over this firft covering is a fecond, of the fame form and width, the ample fleeves of which defcend likewife to the finger-

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ends. This is called a *coftan*, and is ufually made of filk ftuff, richer than the former. Both thefe are faftened at the waift by a long belt, which divides the whole drefs into two bundles. Above them is a third, which is called *djouba*, which is of cloth without lining, and is made nearly in the fame manner, only the fleeves are cut at the elbow. In winter, nay frequently even in fummer, this djouba is lined with fur, and is converted into a peliffe. Laftly, over thefe three wrappers, they put on an outer garment, called the *benifhe*. This is the cloak or robe of ceremony, and completely covers the whole body, even the ends of the fingers, which it would be deemed highly indecent to fuffer to appear before the great. The whole habit, when the benifhe is on, has the appearance of a long fack, from out of which is thruft a bare neck, and a bald head, covered with a turban. The turban of the Mamlouks, called a *kaouk*, is of a cylindrical fhape, yellow, and turned up on the outfide with a roll of muflin artificially folded. On their feet, they wear a fock of yellow leather, which reaches up to the heels, and flippers without quarters, always liable to be left on the road. But the moft fingular part of this drefs is a fort of pantaloon, or trowfers, fo long as to reach up to the chin, and fo wide, that each of the legs is large enough to contain the whole body, and made of that kind of Venetian cloth which the French call *faille*, which, although as pliant as the *d'Elbœuf* cloth, is thicker than the *burre* of Rouen; and that they may walk more at their eafe, they faften, with a running fafh, all the loofe parts of the drefs we have been defcribing.

As to their horfe accoutrements, they are far from having adopted any modern improvements. Continually the flaves of cuftom, the horfes faddle among them is a clumfy frame, loaded with wood, leather, and iron, on which a truffequin rifes behind, eight inches in height above the hips of the horfeman. A pummel before projects four or five inches, fo as to endanger his breaft, fhould he ftoop. Under the faddle, inftead of a ftuffed frame, they fpread three thick woollen coverings, and the whole is faftened by a furcingle, which, inftead of a buckle, is tied with leather thongs, in very complicated knots, and liable to flip. They ufe no crupper, but have a large martingale, which throws them on the fhoulders of the horfe. Each ftirrup is a plate of copper longer and wider than the foot, with circular edges, an inch high in the middle and gradually declining toward each end; the edges are fharp, and are ufed inftead of fpurs, to make long wounds in the horfe's fides. The common weight of a pair of thefe ftirrups is between nine and ten pounds, and frequently exceeds twelve or thirteen. The faddle and faddle-cloths do not weigh lefs than five-and-twenty; thus the horfe's furniture weighs above fix-and-thirty pounds, which is fo much the more ridiculous, as the Egyptian horfes are very fmall.

The bridle is equally ill contrived; it is a kind of fnaffle, but without a joint, and with a curb, which, being only an iron ring, binds the jaw fo as to lacerate the fkin, fo that the bars are injured, and the horfe abfolutely has no mouth. This neceffarily refults from the practice of the Mamlouks, who, inftead of managing the mouth, like us, deftroy it by violent and fudden checks, which they employ particularly in a manœuvre peculiar to them. This confifts in putting the horfe on a full gallop, and fuddenly ftopping him, when at his higheft fpeed. Checked thus by the bit, the horfe bends in his hind legs, ftiffens the fore, and flides along like a horfe of wood. How much this manœuvre muft injure the legs and mouth may eafily be conceived; but the Mamlouks think it graceful, and it is adapted to their mode of fighting. Notwithftanding however their fhort ftirrups, and the perpetual motion of their bodies, it cannot be denied that they are firm and vigorous horfemen, and that they have a warlike appearance, which pleafes the eye even of a ftranger; it muft alfo be allowed, they have fhewn more judgment in the choice of their arms.

The principal weapon, among the Mamlouks, is an Englifh carbine, about thirty inches long, and of fo large a bore as to difcharge ten or twelve balls at a time, which, even without fkill, cannot fail of great execution. They befides carry at their belt two large piftols, which are faftened to fome part of their garments by a filk ftring. At the bow of the faddle fometimes hangs a heavy mace, to knock down their enemy, and on the left thigh is fufpended, by a fhoulder-belt, a crooked fabre, of a kind little known in Europe; the length of the blade, in a right line, from the hilt to the point, is not more than twenty-four inches, but meafured in the curve is at leaft thirty. This form, which appears whimfical to us, has not been adopted without motives; experience teaches us, that the effect of a ftraight blade is limited to the place and moment of its fall, as it acts merely from preffure: a crooked blade, on the contrary, prefenting its edge in retiring, flides by the effort of the arm, and continues its action longer. The Barbarians, who generally apply themfelves moft to the deftructive arts, have not fuffered this obfervation to efcape them; and hence the ufe of fcymetars, fo general and fo ancient in the Eaftern world. The Mamlouks commonly procure theirs from Conftantinople, and from Europe; but the Beys rival each other in Perfian blades, and in fabres of the ancient fteel of Damafcus, for which they frequently pay as high as forty or fifty pounds fterling. The qualities they efteem in them are lightnefs, the equality and ring of the temper, the waving of the iron, and, above all, the keennefs of the edge, which it muft be allowed is exquifite; but thefe blades have the defect of being as brittle as glafs.

The art of ufing the arms above defcribed, conftitutes the education of the Mamlouks, and the whole occupation of their lives. Every day, early in the morning, the greater part of them refort to a plain, without Cairo, and there, riding full fpeed, exercife themfelves in drawing out their carbine expeditioufly from the bandaleer, difcharging it with good aim, and then throwing it under their thigh, to feize a piftol, which they fire and throw over their fhoulder; immediately firing a fecond, and throwing it in the fame manner, trufting to the ftring by which they are faftened, without lofing time to return them to their place. The Beys who are prefent encourage them; and whoever breaks the earthen veffel which ferves by way of butt, receives great commendations and money, as a recompence. They practife alfo the management of the fabre, and efpecially the *coup de revers* which cuts upwards, and is the moft difficult to parry. Their blades are fo keen, and they handle them fo well, that many of them can cut a clew of wet cotton, like a piece of butter. They likewife fhoot with bows and arrows, though they no longer ufe them in battle. But their favourite exercife is throwing the *djerid*: this word, which properly means a reed, is generally ufed to fignify any ftaff thrown by the hand after the manner of the Roman pilum. Inftead of a ftaff, the Mamlouks make ufe of branches of the palm-tree, frefh ftripped. Thefe branches, which have the form of the ftalk of an artichoke, are four feet long, and weigh five or fix pounds. Armed with thefe, the cavaliers enter the lifts, and riding full fpeed, throw them at each other from a confiderable diftance. The affailant, as foon

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as he has thrown, turns his horfe, and his antagonift purfues, and throws his in his turn. The horfes, accuftomed to this exercife, fecond their mafters fo well, that they feem alfo to fhare in the pleafure. But this pleafure is attended with danger; for fome can dart this weapon with fo much force, as frequently to wound, and fometimes mortally.

As to military fkill the Mamlouks know nothing of our military arts; they have neither uniforms, nor order, nor difcipline, nor even fubordination. Their troops are a mob, their march a riot, their battles duels, and their war a fcene of robbery and plunder, which ordinarily begins even in the very city of Cairo; and, at the moment when there is the leaft reafon to expect it. A cabal gathers together, the Beys mount on horfeback, the alarm fpreads, and their adverfaries appear: they charge each other in the ftreet, fabre in hand: a few murthers decide the quarrel, and the weakeft or moft timid is exiled. The people are mere cyphers in thefe affrays. Of what importance is it to them that their tyrants cut each other's throats? But it muft not be imagined that they ftand by indifferent fpectators, that would be too dangerous in the midft of bullets and fcymetars; every one makes his efcape from the fcene of action till tranquillity is reftored. Sometimes the populace pillage the houfes of the exiled, which the conquerors never attempt to prevent.

In the field, they advance towards their enemies, mutual defiances pafs, the attack begins, and every one choofes his man: they fire, if they can, and prefently fall on with the fabre: it is then the manageablenefs of the horfe and dexterity of the cavalier are difplayed. If the former falls, the deftruction of the latter is inevitable. In defeats, the valets, who are always prefent, remount their mafters; and if there are no witneffes near, frequently knock them on the head to get the fequins they happen to have about them. The battle is often decided by the death of two or three of the combatants.

The interefted and inconftant character of this militia, is a neceffary confequence of its origin and conftitution. The young peafant, fold in Mingrelia or Georgia, no fooner arrives in Egypt, than his ideas undergo a total alteration. A new and extraordinary fcene opens before him, where every thing conduces to awaken his audacity and ambition; though now a flave, he feemed deftined to become a mafter, and already affumes the fpirit of his future condition. He calculates how far he is neceffary to his patron, and obliges him to purchafe his fervices and his zeal; thefe he meafures by the falary he receives, or that which he expects; and as in fuch ftates money is the only motive, the chief attention of the mafter is to fatisfy the avidity of his fervants, in order to fecure their attachment. Hence, that prodigality of the Beys, fo ruinous to Egypt, which they pillage; that want of fubordination in the Mamlouks, fo fatal to the chiefs whom they defpoil; and thofe intrigues, which never ceafe to agitate the whole nation. No fooner is a flave enfranchifed than he afpires to the principal employments; and, who is to oppofe his pretenfions? In thofe who command, he difcovers no fuperiority of talents which can imprefs him with refpect; in them he only fees foldiers like himfelf, arrived at power by *the decrees of fate*; and if it pleafe fate to favour him, he will attain it alfo, nor will he be lefs able in the art of governing, which confifts only in taking money, and giving blows with the fabre.

From this fyftem alfo has arifen an unbridled luxury, which, indulging the gratification of every imaginary want, has opened an unlimited field to the rapacity of the great. This luxury is fo exceffive, that there is not a Mamlouk, whofe maintenance cofts lefs than 2500 livres (or 104*l.*) annually, and many of them coft double that fum. At every return of the Ramadan, they muft have a new fuit, French and Venetian cloths, and Damafcus and India ftuffs. They muft often likewife be provided with new horfes and harnefs. They muft have piftols and fabres from Damafcus, gilt ftirrups, and faddles and bridles plated with filver. The chiefs, to diftinguifh them from the vulgar, muft have trinkets, precious ftones, Arabian horfes of two or three hundred pounds value, fhawls of Cafhmire worth from five-and-twenty to fifty pounds each, and a variety of peliffes, the cheapeft of which cofts above twenty pounds. The women have rejected the ancient cuftom of wearing fequins on the head and breaft, as not fufficiently fplendid and coftly, and in their ftead have fubftituted diamonds, emeralds, rubies, and the fineft pearls; and to their fondnefs for fhawls and furs, have added a paffion for Lyons ftuffs and laces. When fuch luxuries are become the neceffaries of thofe whofe authority is without controul, and who neither refpect the rights of property, nor the life of their inferiors, it is eafy to conceive what muft be the condition of their fubjects who are obliged to furnifh them with whatever their caprice may require.

As to the manners of the Mamlouks, though born for the moft part in the rites of the Greek church, and circumcifed the moment they are bought, they are confidered by the Turks themfelves as renagadoes, void of faith and of religion. Strangers to each other, they are not bound by thofe natural ties which unite the reft of mankind. Without parents, without children, the paft has done nothing for them, and they do nothing for the future. Ignorant and fuperftitious from education, they become ferocious from the murders they commit, perfidious from frequent cabals, feditious from tumults, and bafe, deceitful, and corrupted by every fpecies of debauchery. They are, above all, addicted to that abominable wickednefs which was at all times the vice of the Greeks and of the Tartars, and is the firft leffon they receive from their mafters. It is difficult to account for this tafte, when we confider that they all have women, unlefs we fuppofe they feek in one fex, that poignancy of refufal which they do not permit the other. It is however very certain, that there is not a fingle Mamlouk but is polluted by this depravity; and the contagion has fpread among the inhabitants of Cairo, and even the Chriftians of Syria who refide in that city. Brown's Travels; Sonnini's Travels; and Volney's Travels, vol. i.

MAMANDY, a town of Hindooftan, in the Carnatic; 35 miles E. of Coilpetta.

MAMANOOK, one of the Sooloo iflands. N. lat. 6° 3'. E. long. 121° 45'.

MAMARACPOUR, a town of Hindooftan, in Benares; 20 miles S.E. of Chunar.—Alfo, a town of Bengal; nine miles S. of Moorley.

MAMARONECK, a townfhip of America, in Weft Chefter county, New York, containing 512 inhabitants.

MAMAT, St., a town of France, in the department of the Cantal, and chief place of a canton, in the diftrict of Aurillac. The place contains 1408, and the canton 8181 inhabitants, on a territory of 325 kiliometres, in 13 communes.—Alfo, a town of France, in the department of the Gard, and chief place of a canton, in the diftrict of Nimes; nine miles N.W. of Nîmes. The place contains 561, and the canton 6066 inhabitants, on a territory of 162½ kiliometres, in 15 communes.

MAMBARY, a town of Hindooftan, in the province of Dindigul; 20 miles N. of Dindigul.

MAMBATENAWAN, a fmall ifland in the Eaft Indian

Indian sea; 50 miles N.E. of Borneo. N. lat. 6° 26′. E. long. 118 45′.

MAMBIPILLY, a town of Hindoostan, in Mysore; 23 miles E.S.E. of Chinna Balabarum.

MAMBURAO, a town on the W. coast of the island of Mindoro. N. lat. 13′ 12′. E. long. 120 45′.

MAMDEBAD, a town of Hindoostan, in Oude; 12 miles S.W. of Furruckabad.

MAMELLS, a small island on the N. side of lake Superior. N lat. 48 26. W. long. 88 4′.

MAMENDA, a town of Hindoostan, in the circar of Guntoor; 10 miles N.W. of Innaconda.

MAMERS, a town of France, and principal place of a district, in the department of the Sarthe; 23 miles N.N.E. of Le Mans. The place contains 5382, and the canton 15,913 inhabitants, on a territory of 212½ kiliometres, in 22 communes.

MAMERTINI, in *Ancient Geography*, a people of Italy, in Campania; they passed over into Sicily, and established themselves at Messina, where they became so powerful, that they were masters of the place.

MAMERTIUM, a town of Italy, in Brutium, near the source of the Metaurus, and the Brutian forest. The name was formed of Mamers, which was the appellation of the god Mars, in the language of the country. It is probable, that the soldiers of whom Polybius speaks, who made themselves masters of Messina, and who were denominated Mamertins, derived their name from this town.

MAMERVAN, a town of Persian Armenia; 45 miles S.S.W. of Kars.

MAMHOFKA, a town of Poland, in the palatinate of Braclaw; 56 miles S.E. of Braclaw.

MAMIRA, in the *Materia Medica of the Arabians*, a root frequently mentioned by Avicenna, Serapion, and other of the Arabian writers. It seems mentioned as a poisonous drug, and is so described, that it seems to be the same with one species of the durunegi, or doronicum of the same authors, and the common doronicum of the shops, distinguished from the antithora, or other sort of durunegi, by the yellowness of the inside of the root. Avicenna says that it is hard and woody, and formed of knots or joints. This is the very description the same author gives of the durunegi of the first or poisonous kind. Paulus Ægineta says its root is composed of several joints also; and Alphagus calls it a nodose or jointed root. Some have supposed that the mamira was the same plant which we call small celandine, but this has no title to be placed among the plants suspected as poisonous, nor any other plea to be guessed at as the mamira, but only because its roots consist of many tubercles. Many things beside have been conjectured to be the mamira of the Greeks and Arabians, but the doronicum seems to be the plant See DORONICUM.

MAMISTA, in *Geography*, a town of Asia, in Cilicia, which was taken by the emperor Phocas, and which probably was the same with "Mamistra," often mentioned by William of Tyre. See MOPSUESTIA.

MAMMA, in *Anatomy*. See BREAST.

MAMMA, *Cancer of*. See CANCER *and* SCIRRHUS.

MAMMA, *Removal of*. The operation of amputating a diseased breast is described in the article EXTIRPATION.

MAMMALIA, in *Natural History*, the first class of animals in the Linnæan system, divided into seven orders, *viz. primates*, *bruta*, *feræ*, *glires*, *pecora*, *belluæ*, and *cete*.

The characters of this class, according to the description of Linnæus, are as follow; the heart has two auricles and two ventricles; the blood is warm and red; the lungs respire regularly, alternate; the jaws are horizontally incumbent on each other, and covered with lips, within which the teeth are, for the most part, included; they procreate by an intrant penis; and are viviparous and lactiferous: their organs of sense are the tongue, nostrils, eyes, ears, and cutaneous papillæ: they are covered with hair, which is thin on the animals of the warmer regions, and very scanty on aquatic animals: their motive organs are four legs and feet; except those which are entirely confined to the water, whose hinder legs are wanting: most have tails.

MAMMALIA, *Anatomy of*, has had much attention bestowed upon it, under the supposition of its being immediately applicable to the explanation of the functions of the human body. Particular parts of the subject have been successfully prosecuted with this view, both on the continent and in this country, but it is only lately that the anatomical history of the class has been formed into a system, chiefly by the labours of Cuvier and his assistants, who have not only filled up many details that were required, but have also added very interesting dissections of several quadrupeds, hitherto but little known.

Naturalists have almost universally included human beings in the class of mammalia, in consequence of their possessing the peculiar characters which distinguish this class from those of other animals. In this dictionary, however, the arrangement of animals for the purpose of describing their anatomy has been made under a contemplation of the mental endowments, and the social and moral propensities of man, which we conceive entitle him to a distinct rank in the scale of living beings; but if it were even otherwise, it became necessary, according to the plan of the dictionary, to separate man from mammalia, in order that human and comparative anatomy might be treated as distinct subjects.

Organs concerned in the Exercise of the vital Functions.

The Mouth and its contained Parts, or the Organs of Mastication.—The *aperture* and *internal cavity* of the mouth have a different form in mammalia from that in the human subject, with the exception of those species of *monkey* which approach mankind in general conformation.

The mouth of mammalia, in general, is capable of being opened widely, in consequence of the division of the lips being extended on each side backwards. This structure is most remarkable in the *beasts of prey*, and least so in the gnawing quadrupeds. The aperture of the mouth is peculiarly small in the *ant-eaters* and other *insectivorous* quadrupeds.

The *cavity* of the mouth, except in some of the *monkey* tribe, is considerably longer from before backwards, than in the transverse direction. This is particularly the case in the *ruminant* and *gnawing* quadrupeds, and is a shape of the mouth peculiarly well adapted for the minute division of the aliments, as they are more completely subjected to the action of the grinding teeth, and to the motions of the tongue, and the muscular parietes of the mouth.

The figure and magnitude of the cavity of the mouth depend upon the form and mechanism of the two jaws, but especially the lower one, which we shall describe when treating of the organs of motion.

The membrane which lines the mouth of mammalia is commonly more largely supplied with mucous glands than it is in the human subject; it is also more plainly covered by cuticle. Many of the *graminivorous* quadrupeds have a very thick cuticle spread over the inside of the mouth.

Several quadrupeds, and especially those which ruminate, have the roof and sides of the mouth covered with flat and pointed processes: these are mostly directed backwards, from which it would seem, that they are designed to facilitate

tate the paffage of the food through the mouth. When thefe proceffes form foft pointed projections, fomewhat like fringe on the infide of the lips, they may conftitute a furface for receiving the impreffion of fapid bodies.

There are three forts of *teeth* found in mammiferous animals. The firft are employed in the fimple divifion, and the grinding or chewing of the food: the fecond can only be ufed for feizing and detaining the prey until it is fwallowed; and teeth of the third kind are intended for weapons or inftruments of defence.

The firft defcription of teeth admits of being fubdivided into three forts; firft, the *incifive* or *cutting* teeth; fecondly, the *canine* or *lacerating*; and thirdly, the *molar* or *grinding* teeth. We fhall firft defcribe the form and compofition of the teeth, and afterwards fpeak of their mode of growth.

The *incifive* teeth are always fituated, as a matter of neceffity, in the front of the mouth.

They are commonly fuppofed to be formed of two fubftances; the proper offeous part which conftitutes the bafis of teeth in general, and the enamel. In fome quadrupeds, however, we have found the third fubftance that enters into the compofition of teeth, or the *crufta petrofa*, upon the fangs and fides of the incifors of fome quadrupeds. The front teeth appear to be originally covered with crufta petrofa in the *horfe*: certainly fome of this fubftance remains in the cavity of the cutting edge, and upon the fides and fangs of the incifors of the *horfe* during life.

The figure of the incifor teeth is more or lefs that of a wedge. In the *monkey* tribe, they almoft refemble thofe of the human fubject, having rather thin and flat bodies, fuftained upon round ftalks. In the *lemur*, the lower incifors have a fingular pofition; they lie down before. In the *flying lemur* (*galeopithecus*) the front teeth are divided for fome way from the edge into narrow proceffes, which ftand parallel to each other, like the teeth of a comb. Some *cats* likewife have them denticulated upon the edge. Several *carnivorous* quadrupeds have the incifors terminating in one or more points.

The *faltigrade* mammalia are diftinguifhed by the peculiar ftructure of their incifive teeth. There are ufually two of them in each jaw, placed in the centre of the front of the mouth. They have moft commonly a thin fharp edge. In fome fpecies of the *rat* kind and the *fquirrels*, the inferior incifors are pointed and compreffed upon the fides. The enamel often does not furround the teeth, but is depofited only upon the anterior furface; the confequence of which is, that as the fubftance wears fafter than the enamel, the latter always prefents a fharp edge. The enamel is fometimes ftriated tranfverfely, or is longitudinally grooved, as in the *hare*. There are feveral incifor teeth in the upper jaw of the *kanguroo*, but only two in the lower jaw: thefe are directed fo much forwards, that they would feem to have but little concern in the divifion of the food. All the front teeth of the *kanguroo* are covered with an enamel of fo clofe a texture that it refembles porcelain, or a femi-vitrified fubftance. No animals employ their incifor teeth fo conftantly or with fo much effect as the *faltigrade* quadrupeds. Every perfon is well acquainted with the deftructive powers of the *rat* kind. The *beaver* is able to gnaw trees acrofs. It is upon the mode of ufing the front teeth that Cuvier has eftablifhed his order in mammalia of *Rodentia*, which includes the fame animals that we have denominated *faltigrade*, from their leaping manner of progreffion. The incifive teeth of the *rodentia* are continually wearing away at the end, more efpecially thofe in the lower jaw; and to make up for the wafte, they poffefs a long root, which contains a large vafcular pulp that is always adding new offeous matter to the tooth. In the *beaver*, and many of the *rat* genus, the length of the roots of the gnawing teeth is very remarkable. They extend backwards as far as the coronoid procefs of the lower jaw, and are contained in a canal which runs beneath the molar teeth in the fubftance of the maxillary bone. In the upper jaw this canal does not pafs farther back than above the firft molar tooth. In order to prove the continual wear and growth of the front teeth in the gnawing quadrupeds, it is only neceffary to take one of this tribe that makes much ufe of its incifors, and fuftain it for fome time upon foft food, when it will be found that the lower teeth will grow fo long as to turn up and penetrate the fkull.

Amongft the large quadrupeds with feveral hoofs, or the *pachidermata* of Cuvier, there is confiderable variety in the incifive teeth. They are wanting in the *elephant* and in the *African rhinoceros*. The *Afiatic rhinoceros* has in the upper jaw two large wedge-fhaped teeth and two fmall lateral ones, which are caft early, and in the lower jaw there are two large cylindric teeth, and two very fmall conic teeth between.

Cuvier remarks that, generally, the *many-hoofed* quadrupeds lofe the whole or part of their incifors at a certain period of life, without their being replaced by others.

The *bifulca* want incifors in the upper jaw.

The incifive teeth of the *horfe* have a depreffion or flight cavity in their cutting furface. The enamel is continued into this cavity, and we have likewife difcovered that the crufta petrofa paffes into it, and gives a covering to the enamel, notwithftanding which the front teeth of the *horfe* gradually wear down until thefe cavities are obliterated. The degree of wafte which the incifors experience ferves to determine the age of horfes. The incifors of the *beaver*, *marmot*, *fquirrel*, &c. are of a brown colour on their anterior furface. This would feem to be a ftain of the enamel, and not an incruftation, fuch as takes place upon the teeth of feveral of the *cloven-footed* quadrupeds. The latter is a dark coloured earthy fubftance, which receives a polifh and a green metallic appearance upon the furface. This incruftation has always appeared to us to be of the nature of the bezoar ftones, found in the alimentary canal of the fame quadrupeds.

All the front teeth of the *feal* are conical and fharp-pointed, and are therefore more calculated for holding the animal's prey than dividing it.

The *morfe* (*trichecus rofmarus*) has two little truncated teeth, fimilar to molares, in the intermaxillary bone between the tufks, but no front teeth in the lower jaw.

The *canine* or *lacerating* teeth in the *ourang-outang*, and fome other *monkies*, have the fame form of the incifors, in which circumftances thefe animals refemble the human fubject. In moft of the *monkey* kind, however, the teeth in the corners of the front of the mouth poffefs their proper characters, being pointed, conic, and fo long as to pafs each other in a greater or lefs degree when the jaws are fhut. In fome *baboons* the canine teeth are remarkably long.

The *lemurs* have them hooked and compreffed upon the fides. They are long and conic in the *loris*. The *flying lemur* (*galeopithecus*) has them fhort, broad, and notched like a faw.

In fome of the *plantigrade* mammalia, as the *hedge-hogs* and *frews*, they do not rife much above the neighbouring teeth, and are bicufpid.

Blumenbach defcribes fmall canine teeth in the *bear* genus, which are fituated immediately behind the principal canini. He found this remarkable ftructure to exift in the *brown bear* of the Alps, the *black bear*, the *polar bear*, and in the

fkeleton

ſkeleton of one whoſe country is unknown, preſerved in the National muſeum at Paris.

It is in the *digitigrade* quadrupeds that the form of the canine teeth is moſt perfect: in theſe they always are long, pointed, ſharp, curved backwards, and generally thoſe of one jaw paſs the correſponding ones of the other jaw conſiderably, when the mouth is cloſed The moſt ſtriking inſtances of this are ſeen in the *tyger*, *pole-cat*, and *badger*.

Naturaliſts have conſidered the tuſks of the *multungulata*, and of the *morſe*, *dugong*, and *narwhal* as canine teeth, which from their ſituation they are entitled to be conſidered, but as they can only be employed as weapons, we ſhall refer their deſcription to a ſubſequent part of this article.

The canine teeth exiſt only amongſt ſuch of the *cloven-footed* quadrupeds as want the true horns. In the *ſtag*, *camel*, *dromedary*, and *lama*, they do not grow to any length, and appear to be in a great meaſure uſeleſs to theſe animals. The ſame ſtructure obtains in the *horſe*. The *tuſhes*, as they are popularly called, in this animal are ſhort, and ſoon become blunt. They are peculiar to the male, who it is ſaid in a wild ſtate employs them as weapons, but this does not ſeem to be practicable.

The interior compoſition of the canine teeth agrees with that of the inciſors. They are made in all the carnivorous quadrupeds of the common ſubſtance of the teeth, and covered with enamel; but we have diſcovered cruſta petroſa upon the tuſks of the *horſe*, and we conceive it probable that it exiſts upon the canini of the other graminivorous beaſts.

The *grinding* or *molar teeth* are always ſituated in the back part of the mouth, in order to gain the advantage of the lateral motion of the jaws, the ſupply of ſaliva, and the aſſiſtance of the tongue and cheeks in moving the food while it is undergoing trituration.

The figure and compoſition of the molares vary according to the nature of the food, and the habits of the animal to which they belong.

In the genus *Simia* the grinding teeth are very ſimilar to thoſe of the human ſubject: in ſome ſpecies of *monkey*, however, the laſt molar is larger than the reſt, and furniſhed with a fifth tubercle; others have the laſt molar the ſmalleſt.

In the genus *Lemur* the molares begin to be pointed.

In the truly carnivorous quadrupeds they are (with the exception of the moſt poſterior teeth) thin or conical, and end in either one or more ſharp points. They are ſo placed in the two jaws likewiſe, that they are not exactly oppoſed to each other when the jaws are brought together, but paſs each other in a degree, ſo as to divide rather than bruiſe and comminute the food.

The *cat* genus has only one molar tooth with a flat crown and blunt proceſſes, which is ſituated in the upper jaw, and does not correſpond with any teeth of the inferior jaw. It is often loſt without any inconvenience.

The *weaſels* and *martins* have a ſingle tuberculated molar tooth at the back of both jaws. Thoſe of the upper jaw are broad.

The *hyæna* has one large molar, with blunt tubercles on each ſide the upper jaw, and a correſponding one with a pointed proceſs in the lower jaw.

In the genus *Canis* there are two tuberculated molares on each ſide, above and below.

In the other *digitigrade* quadrupeds there is ſome little variety in the number and ſhape of the poſterior tuberculated molares, which ſcarcely deſerves notice.

In all theſe animals the molar teeth have the ſame compoſition as the canine and inciſors, *i. e.* the form of the tooth depends upon the common oſſeous ſubſtance, which is covered on that part ſeen above the gums by enamel: The molars of the carnivorous quadrupeds, from the manner in which they are uſed, do not wear.

The ſmall *plantigrada*, ſuch as the *hedge-hog*, the *mole*, and the *ſhrew*, and amongſt the *pedimana*, the *opoſſum* tribe and the *perameles*, reſemble each other with reſpect to the ſharp tubercles upon ſeveral of their molar teeth. Cuvier has obſerved, that this form of the poſterior molars belongs to the *inſectivorous* quadrupeds, and that another general character of theſe animals is to have their ſuperior teeth broader tranſverſely than thoſe below.

Amongſt the *ſaltigrade* quadrupeds thoſe that live upon a mixed food, as the *marmots* and the *rat* genus, have the molar teeth with tubercles, covered with enamel which does not wear. The other animals of this order have the crowns of the molares flat upon the top. The oſſeous ſubſtance of the teeth is not clothed but intermixed with layers of enamel, which produce a ſtriated or grooved appearance on the ſurface as it wears. Some of the *ſaltigrada* have their molares entirely compoſed of tranſverſe and vertical layers; others have the enamel only forming upon the crown ſome angles, circles, or other figures, without dividing the teeth into ſeparate parts.

The *cavy* has in the upper jaw the firſt molar compoſed of one plate, the ſecond of two, the third of three, the fourth of four, and the fifth of ſix. In the lower jaw each of the three firſt is made of two laminæ and the laſt tooth of eleven laminæ. Many of theſe laminæ, eſpecially anteriorly, are bifurcated. The grinding ſurface of theſe teeth is quite plain, and aſcends obliquely from within outwards.

In the *guinea-pig* the molars are compoſed each of two bifurcated laminæ. The molares of the *hare* and *rabbit* are likewiſe made of two laminæ, but they are not bifurcated. The *phaſcolomys* has molares reſembling thoſe of the *cavy*.

In the *beaver* there is to each molar an angle returning to the external ſide from below, and to the internal from above, and three others more deep on the oppoſite ſide. When the teeth are worn by uſe, the laſt form only elongated and tranſverſe ellipſes upon the crown.

The *jerboa* of the Cape has but one angle returning to the internal ſide below, to the external above.

The molares in the *kanguroo* are furniſhed with tubercles, and thoſe ſituated poſteriorly have their tubercles united by tranſverſe eminences.

The molar teeth of the *dormouſe* have their crowns flat upon the grinding ſurface, which is regularly ſtriated or grooved. The teeth appear, however, to receive only a ſuperficial covering of fine pearl-coloured enamel.

In the *ſeal* the molars are, like all the other teeth, conical. The poſterior ones, however, preſent ſome points. They cannot be uſed in any other manner than as inciſive or lacerating teeth.

The *morſe* and *dugong* have the molares cylindric in their ſhape, and with a flat grinding ſurface. The latter animal has them alſo grooved upon the ſide.

The *lamantin* has two rectilinear tranſverſe eminences, except on the laſt molar teeth, which has three. They are notched before they are worn.

The teeth of the *cetacea*, as before obſerved, are not calculated to perform any of the maſticating proceſs; they can only be uſed to ſeize and detain the prey of theſe animals.

The moſt perfect examples of the true grinding teeth are found amongſt the *large herbivorous* quadrupeds, particularly the *multungulata*. The teeth, neceſſarily, are continually wearing in thoſe quadrupeds that are ſuſtained, excluſively, upon vegetable matters. They are, therefore, moſt commonly

monly found to be intermixed with the enamel, and to be either covered externally or filled up with the crufta petrofa.

If a fection be made of the grinding tooth of the *fheep*, the appearance of two crefcents will be feen with an oblong dark coloured hole in the centre. The crefcents are formed by the defcending productions of enamel, covered on the infide by a layer of the crufta petrofa.

In the *cow*, and in the *cloven-footed* beafts generally, the enamel and crufta petrofa are depofited in the interior of the teeth, fo as to produce upon the grinding furface, or on a tranfverfe fection, the appearance of crefcents, leaving a fpace in the centre, which is ufually kept full of the mafticated food of the animal. Mr. Home has fuppofed that the portions of food impacted in the cavities of the grinding teeth of graminivorous quadrupeds, fupplies the place of crufta petrofa, and contributes to form the mafticating furface. We have never obferved it to be fo hard as to anfwer this purpofe, and the cavity which contains it is always, we believe, covered by a layer of the crufta petrofa.

In the graminivorous quadrupeds there is generally (and perhaps always, though not obferved) more or lefs of the crufta petrofa depofited around the bodies of the molares as well as in the interior. When the teeth are a very little worn, the prominent parts appear uncovered, and fhew the enamel, and the crufta feems only to have filled up the inequalities upon the furface. In the *fheep* there is no crufta apparent upon the outfide of the tooth after it has been ufed; but it is not improbable, from analogy of ftructure, that when the grinders of the *fheep* firft come out of the gums, that they have a thin covering of crufta petrofa.

The grinding furface of the molares of the *horfe* prefents an undulating or zig-zag line, formed by the offeous fubftance of the tooth and enamel encompaffed in the crufta petrofa. The holes in the *horfe's* teeth are much fmaller than thofe of ruminating quadrupeds. Mr Home has fuppofed that they originally gave paffage to a blood-veffel, but in the *horfe*, as well as the *bifulca*, the cavities of the teeth were occupied by the proceffes of the capfule which fecreted the crufta petrofa.

In the *rhinoceros* and *daman* (*hyrax*), the inferior molars are formed of two crefcents placed in a row, and a little obliquely. The tooth fartheft back in the mouth has three crefcents, the anterior molar only one. The molares of the upper jaw are fquare, have a prominent line parallel to the external fide, and two others which pafs tranfverfely and a little obliquely. The fecond of thefe tranfverfe lines in the *rhinoceros* fends forwards a large hooked procefs. In the *daman* they have each a fmall one. The pofterior molar of the upper jaw has fomewhat of a triangular fhape. The anterior tooth has but one tranfverfe line.

In the *hippopotamus*, the molars in the middle part of both jaws have two pair of cones, fet, as it were, back to back. Thefe have two grooves on the oppofite fides to thofe that are applied to each other: each cone, when worn down, prefents on the top the figure of a trefoil. Both Dr. Blake and Mr. Home reprefent that the crufta petrofa does not enter into the compofition of the teeth in the *hippopotamus* and the *rhinoceros*. It has, however, been fince difcovered, by Mr. Macartney, upon the whole of the external furface of the grinding teeth of the *hippopotamus*. It is a thin layer, which is feen worn away from the prominent parts, thus expofing the enamel, and occafioning the miftake refpecting its exiftence. It is highly probable that a fimilar layer of the crufta petrofa is fpread over the molar teeth of the *rhinoceros* when they are firft formed.

The molares of the *elephant* are the plaineft examples of the conftruction of graminivorous teeth. In the Afiatic fpecies, each grinder confifts of a number of thin proceffes of the offeous fubftance, covered with enamel, united and enclofed by a mafs of the crufta petrofa. Thefe proceffes or plates are fituated tranfverfely with refpect to the tooth; and when a vertical fection is made of the latter, they have exactly the form of the teeth of a comb, imbedded in a third fubftance, which is the crufta petrofa. The grinding furface, after it has been ufed, prefents a number of tranfverfe narrow rough ridges, which are continuous at the edges of the tooth, fo as to exhibit the appearance that would arife from the two fides of an oval being compreffed together. They correfpond to the offeous plates that are covered with the enamel. The interfpaces between them are filled up with the crufta petrofa, which wears fafter than either of the other two fubftances compofing the teeth.

In the *African elephant* the proceffes of the offeous fubftance and the enamel are difpofed in the crufta petrofa in fuch a manner, as to give the appearance of rough lines or ridges which form lozenges upon the grinding furface that touch each other in the middle of the tooth.

In the *fus æthiopicus* the molares are formed of feveral cylindric proceffes of offeous fubftance and enamel confolidated together by the crufta petrofa: their grinding furface exhibits oval or angular figures in rows of three each.

The *mammoth*, or the animal whofe foffil remains have been found on the banks of the Ohio, has long been known to poffefs molar teeth that have the fame ftructure as thofe of carnivorous animals, notwithftanding that in the general its fkeleton refembles the *elephant's* fo much, that moft people now believe it to have been the elephant of the American continent. The teeth of this animal are very large: the crown is entirely covered with a thick coat of enamel, and there is no crufta petrofa intermixed with it. The grinding furface is not flat, nor worn down, but prefents two rows of fhort cones. The only appearance there is of friction prefents itfelf upon the fides of thefe cones, or pyramidal eminences, and feems to be occafioned by the teeth of the two jaws fitting into each other, notwithftanding the molar teeth of the *mammoth* appear to be fo well adapted for mafticating animal food. If we may judge from the fkeleton exhibited in this country, it is utterly impoffible the *mammoth* could have been a beaft of prey. It muft have been difqualified from hunting by the ftructure of its limbs, the form of the head and neck, and the unwieldy figure of its whole body. It has been conjectured by fome, and not improbably, that the *mammoth* fubfifted upon the fifh of the large rivers, on the banks of which its bones have been occafionally found.

The *duck-billed* animal of New Holland (*ornithorhynchus paradoxus*) has parts in the back of its mouth which correfpond to the molars of other mammalia, but which have a different compofition. They are not bone, but a horny fubftance: they are oblong, flat, and are merely fixed in the gums. There is one on each fide in both jaws. Mr. Home has defcribed, likewife, two horny proceffes in this animal on the back of the tongue, which he fuppofes to be defigned to prevent the food being fwallowed before it is fufficiently mafticated.

The molar teeth of the *Cape ant-eater* (*Orycteropus*, Geoff.) are extremely fingular. They have the form of two cylinders joined to each other in the fides. They are entirely compofed of a great number of minute, ftraight, and parallel tubes. If a tranfverfe fection be made of thefe teeth, it prefents exactly the fame appearance that is feen on cutting acrofs a ratan, or other monocotyledon; that is, a number of very fmall pores. This tubular ftructure pervades the whole tooth, except at the grinding furface, which is folid.

Cuvier ſtates, that there is no large cavity in the teeth of the *ornithorhynchus*.

The *Ornithorhynchus hyſtrix* has ſix tranſverſe rows of pointed proceſſes at the back of the palate, and about twenty ſimilar ones on the baſe of the tongue: theſe have all a horny ſtructure as the teeth of the *O. paradoxus*.

The *grampus* (*delphinus orca*) has been reported to have teeth in the palate. Cuvier ſuppoſes they may be horny proceſſes, ſimilar to thoſe of the *O. hyſtrix* above-mentioned. But we have lately diſſected this ſpecies of *delphinus*, and have found that nothing of the kind exiſted in the animal.

The organization and mode of growth of teeth, in general, have been much illuſtrated by obſerving their formation in the larger quadrupeds. The vaſcular tender ſubſtance which ſecretes the rudiment or nucleus of the tooth, and on which the tooth continues to grow, is popularly called the *nerve* in the human teeth, from the ſuppoſition of its being a prolongation of the dental branches of the maxillary nerves. In large teeth the pulp is eaſily ſeen to be formed of a peculiar ſpongy ſubſtance, which in the young animal is nearly as ſoft as jelly; its blood-veſſels are extremely numerous and minute; its nerves are probably the ſame, for there is no large branch of the dental nerve contained in the pulp. The ſtructure of the pulps of the teeth ſeems to reſemble in a great degree that of the pulps of feathers and hairs, and of other excrementitious productions. See the articles FEATHERS, HAIRS, HORNS, &c.

In thoſe animals which have the enamel paſſing down into the ſubſtance of the teeth, there are ſeveral proceſſes of the pulp which produce a correſponding number of oſſeous ſhells or moulds, which have been called *denticuli* in ſpeaking of the compound teeth of quadrupeds.

The oſſeous part of the teeth is more compact and hard, particularly in the molares of the large herbivorous quadrupeds, than it is in the teeth of the human ſubject. There is alſo a ſenſible difference between the compoſition of the external and internal parts of the oſſeous moulds of the teeth in quadrupeds. The firſt depoſits of the pulp are very hard, ſtreaked longitudinally of a yellow-greeniſh hue, and ſemi-tranſparent, like topaz. The parts depoſited by the pulp afterwards are more opaque, of the common colour of bone, and ſhewing but little appearance of laminæ. They approach very nearly in ſtructure the fangs, which being laſt formed, moſtly reſemble common bone. The gradual variation in the hardneſs of the oſſeous part of the teeth may be diſcerned, though leſs plainly, in the human ſubject. The ſtreaked appearance above-mentioned, ſhews evidently that the oſſeous moulds of the teeth are ſecreted by the pulp in layers. The growth of this part of the tooth by layers has been likewiſe proved by Mr. Hunter's experiment of feeding a young pig with madder, when the teeth were forming. The oſſeous layers that were depoſited during the uſe of the madder, were ſtained of the pink colour which this dye-ſtuff produces with phoſphat of lime, and the portions of the tooth formed either before or after the madder had been employed, retained their natural colour. Cuvier deſcribes the formation of the oſſeous moulds of the teeth as being effected by ſucceſſive layers, as in the ſhells of the bivalve molluſca, which fact, he ſays, he had an opportunity of obſerving very ſatisfactorily in the gums of the teeth in the young elephant.

In *carnivorous* quadrupeds, as in *man*, the *roots* or *fangs* of the teeth are formed about the time that the crowns make their way through the gums, but in thoſe *graminivorous* quadrupeds whoſe teeth are ſubjected to much wear, the roots are added ſome time after the eruption of the teeth from the gums, by which means their proper length is preſerved a longer time for maſtication.

The ſtructure of the enamel is very plainly ſeen in the teeth of the large quadrupeds. The eccentric arrangement of its fibres is particularly ſtriking, when a ſection is made of any of the large grinding teeth, in which the enamel paſſes beyond the ſurface. The ſtriæ are in theſe inſtances intermixed at their extremities with the cruſta petroſa, and produce an appearance not unlike the barbs of a feather. Cuvier, in ſpeaking of the enamel, compares it in the tooth of the young *elephant* to the fibres of aſbeſtos, or to the pile of velvet. He obſerves, alſo, that theſe fibres are not always rectilinear, more frequently deſcribing curves, of which the convexity is turned towards the crown of the tooth. The ſame arrangement of the fibres of the enamel, he ſays, exiſts in the *ruminant* quadrupeds. It has, however, eſcaped our attention.

It is well known that the enamel is a production of the capſules of the teeth, but it ſeems yet undecided whether it be a ſecretion immediately performed by the capſule, or a cryſtallization of the fluid contained in it. Mr. Home adopts the latter opinion, and ſuppoſes that the fluid in the capſules of the teeth is ſimilar to ſynovia, which yields, upon chemical examination, a certain portion of phoſphat of lime. It appears to us that the quantity of earthy matter found in ſynovia, ſuppoſing it to be the ſame in the fluid of the capſules of the teeth, is quite inſufficient to account for the production of the enamel. There are only 21 parts of reſidue out of 970 parts of ſynovia, and but a ſmall part of this reſidue is found to be phoſphat of lime: beſides, it ſhould be obſerved, that the fibrous arrangement of the enamel is unlike what would probably be produced by a proceſs of cryſtallization; the diſtribution of the enamel as to quantity alſo would be different from what it is upon the ſurface of the tooth: thus in ſome teeth there is little or no enamel upon the poſterior ſurface, as in the inciſors of the *gnawing* quadrupeds and the tuſks of the *hippopotamus*.

Writers have diſagreed with reſpect to the chemical compoſition of the enamel. Some have denied that it contains any animal matter; moſt, however, allow that it poſſeſſes a very little, upon which, moſt probably, its fibrous ſtructure depends. Morrichini, a chemiſt at Rome, found fluoric acid in the enamel of the foſſil teeth of the *elephant*, and afterwards in leſs quantity in the enamel of the human tooth, the different proportions he aſcribed to the foſſil teeth containing leſs animal matter. His experiments upon the human teeth go to ſhew that the enamel conſiſts of 30 parts of animal ſubſtance, 22 parts of fluat and phoſphat of lime, with ſome magneſia, alumine, and carbonic acid. Mr. Hatchett and Mr. Brande both failed to detect any fluat of lime in the enamel of teeth.

In the compound teeth of the graminivorous quadrupeds, where the enamel is extended from the ſurface between the denticuli, there are correſponding proceſſes of the capſule which paſs from the ſide of the gums. Theſe have, in our opinion, been very improperly called ligaments by Mr. Home. They neither reſemble ligaments in their functions or ſtructure; they are much more like the pulps.

The third ſubſtance entering into the compoſition of the teeth is peculiar to certain mammiferous animals, and is not found in the human ſubject: the hiſtory of it, therefore, is only to be obtained from the late writers upon the teeth. It was firſt called *cruſta petroſa* by Mr. Blake, a very appropriate name, as it appears like a ſtony or inorganic incruſtation on the other ſubſtances of the teeth. Mr. Home, from conſidering that it more nearly approaches the nature of common bone than the other parts of the teeth, has termed

termed it the *offeous* or *bony portion*. The French writers have called it the *cement*, on account of its confolidating into one the different denticuli of the grinding teeth in *graminivorous* quadrupeds.

This fubftance has a pale yellow colour, is uniform in its texture, exhibiting neither fibres nor layers; it is more folid, denfe, and heavy, but lefs hard, friable, or elaftic, than the other parts of the tooth: it refembles more the callous or the offeous matter, poured out in confequence of inflammation, than any other fubftance in the animal body. It always is found depofited in the interftices or depreffions of the teeth; and it is only after thefe are filled, that it appears to give a covering to the more prominent parts. The fuperficies of the crufta petrofa is never regular or fmooth, until it is worn by maftication; and on many parts of the teeth, particularly about the roots, it prefents the appearance of congealed drops of a matter which had been in a fufed ftate. In the *cavy*, however, it contains a multitude of regularly arranged pores.

Tenon fuppofes that the crufta petrofa is produced by the offification of the membrane which had enveloped the teeth. Mr. Blake afcribes its formation to the furface of the membrane oppofite to that which fecretes the enamel. Cuvier, however, gives a more rational account of the matter: he fays, that the internal membrane of the capfule, after it has depofited the enamel, undergoes a change of ftructure, becoming thick, fpongy, opaque, and more vafcular, in order to furnifh the crufta petrofa; that this laft is fhed, as it were, in drops, which form irregularly upon the furfaces of the teeth. When the internal membrane of the capfule is prolonged into proceffes that pafs into the interfpaces of the compound teeth of the large quadrupeds, they become changed in like manner, after depofiting the enamel in thefe fituations, and then fecrete the crufta, which ferves to unite the denticuli into one tooth. This circumftance he had an advantageous opportunity of obferving, during the developement of the teeth in the *elephant*.

The crufta petrofa wears fafter than either the offeous mould or enamel of the teeth, and thence its ufe in the herbivorous animals; the two firft always prefenting upon the grinding furface of the teeth certain eminences, which vary in their figure in different fpecies, as already defcribed, and which operate in the divifion of the food in the fame manner as the irregular eminences on mill-ftones.

The *fucceffion* of the teeth is regulated in mammalia in general as in the human fubject. The front teeth are replaced by larger ones, at an early age; and after thefe and the grinders all come forth, they remain during the life of the animal. In thofe quadrupeds which employ their teeth in a way that fubjects them to much wear, particular provifions become neceffary. We have already mentioned, that the gnawing teeth of the *faltigrade* mammalia continue to grow in the fame proportion as they wear; and the confumption of the grinding teeth, in fome of the large herbivorous quadrupeds, is fupplied by a fucceffion not only of frefh teeth, but by the manner in which thefe come forth from the jaw.

The *elephant* affords the moft ftriking example of this mode of fucceffion. Although this animal has the rudiments of feveral teeth formed in its jaws, we never find more than two on each fide of both jaws at once, *i. e.* eight grinders in the whole: often there is only one apparent in each fide of both jaws. The molares of the *elephant*, as before obferved, are compound, or confift of feveral laminæ or denticuli, united together by crufta petrofa. The firft, or milk grinder, as it is called, pufhes through the gum eight or ten days after birth, and is not completely expofed until the third month: it confifts of four laminæ or denticuli. The fecond grinders, which confift each of eight or nine denticuli, are uncovered in two years. In proportion as the new teeth appear, the preceding ones gradually wear down, and finally have their fangs, and the fockets which contain them, removed by abforption. The whole of a tooth is never feen in the mouth at any one time: indeed it does not exift; for the pofterior portion of the tooth is not completely formed, and does not penetrate the gum, until the anterior portion is entirely worn down. Thus a grinder, confifting of twelve or fourteen denticuli, will have the anterior part worn, and even abforbed, a few denticuli of the middle partially worn and in ufe, and the pofterior denticuli imbedded in the jaw, and their fangs in a ftate of growth, all at the fame moment. This mode of growth and prefentation of the teeth in the *elephant* is admirably calculated for maintaining the grinding furface.

In proportion to the *elephant's* age, the new grinders are formed, larger and of a greater number of denticuli, by which they remain longer in ufe. Thus the third fet have each twelve or thirteen denticuli. They begin to appear when the fecond fet have been all expofed, and difplace thefe at fix years of the animal's age. The fourth fet of grinders are made of fifteen denticuli, and prefent the different parts of their grinding furface from the fixth to the ninth year of age. From the fourth fet to the eighth the number of denticuli varies from fifteen to twenty-three, which is the greateft number that has yet been difcovered in the grinding teeth of the *elephant*. The periods at which the laft fets of teeth penetrate the gums have not been clearly afcertained; but it is fuppofed by Mr. Corfe, who has paid much attention to this fubject, that each fet requires one year longer for its developement than the fet preceding it.

Mr. Home has difcovered that the teeth of the *fus æthiopicus*, which are compofed of feveral denticuli, have a mode of fucceffion fimilar to what has been defcribed in the *elephant*. He concludes from hence, that this animal has greater longevity than the others of the fame genus.

Something of the fame kind exifts in the *wild boar*, and in the *animal incognitum*, according to Mr. Home's obfervations.

The periods at which the molares of the *horfe* come forth, and are fhed, have been lately afcertained by Mr. Tenon; by which it appears that the anterior molares are fhed, and the pofterior are late in appearing: the laft molar cuts the gum only at the fifth or fixth year. The milk grinders of the *horfe* are oblong at firft from before backwards; but, by the preffure of thofe behind, become fquare: the teeth which replace them are alfo fquare.

The mode of fucceffion is nearly the fame in the teeth of the ruminating quadrupeds.

It is only upon animals which live in a domeftic ftate, that accurate obfervations can be made with refpect to the fucceffion of the teeth. This partly accounts for the very few number of facts known upon the fubject. Blake ftates, that the grinders of the *beaver* prefent themfelves in a manner fomewhat fimilar to what has been defcribed in the *elephant*.

The fecond kind of teeth, or thofe for feizing and detaining the prey of the animal, are found in the *cetaceous* tribe of *mammalia*.

In the genus *delphinus*, the teeth are numerous in both jaws. They are nearly conical in their form; thofe of the *porpoife*, however, have the bodies of the teeth flattened, and the roots cylindrical. In the *grampus*, the natural fhape is very much altered by wearing. In this genus, the teeth are lodged in regular bony alveoli; and we have afcertained that a fuca fucceffion is kept up, by new teeth forming in the bottom of the fockets, which pufh out the old ones as they are worn down.

The teeth of the genus *delphinus* are compofed only of two fubftances: the ufual offeous part, which conftitutes the mould or bafis of all teeth; and a cortical fubftance of an intermediate texture between enamel and crufta petrofa. In the *porpoife* this external part is hard and polifhed, and does not readily wear; but in the *grampus* we have found it to be fcarcely, if at all, different from the common crufta petrofa, and to wear like it fafter than the offeous fubftance of the teeth. In fact, there is a gradation to be obferved in the cortical part of the teeth of different animals, from the pure cryftalline enamel to the opaque and comparatively foft incruftation found in the true graminivorous teeth. This variation might be expected, when we confider that both thefe fubftances are fecretions of the internal membrane of the capfules of the teeth.

In the *fpermaceti whales* (*phyfeter*), the teeth are fituated in the lower jaw, and received into correfponding fockets of the upper jaw. They are conical, according to Hunter, at both extremities, and are not placed in alveoli, but grow in the gums. In a fpecimen we poffefs, the root of the tooth is nearly as large as any other part; the crown is worn into the fhape of a compreffed pyramid; and the cortical part refembles almoft exactly crufta petrofa in its texture, and not enamel: it is extended entirely over the root of the tooth.

Hunter ftates that the fmall *bottle-nofe whale* has a number of conical teeth in both jaws, *viz.* forty-fix in the upper jaw, and fifty in the lower. He fuppofed that the teeth of the whale tribe were renewed by the jaws growing forwards, and being abforbed at the fymphyfis, while new teeth made their appearance in the pofterior part of the jaws.

The *narwhal* (*monodon*) has only the two remarkable tufks, which we fhall fpeak of under the head of the weapons of mammalia.

The *hyperodon*, formerly placed in the genus *delphinus*, but lately feparated by Lacepede, is faid to have teeth in the palate, fimilar to thofe of the *ornithorhynchus*, and alfo in the jaws.

But the moft fingular apparatus for retaining the prey in the mouth is the *whale-bone* of the *true whales* This fubftance refembles, in its organization and mode of growth, *hair*, *horn*, and *feathers*, &c. (See thefe words in this dictionary.) The whale-bone is fituated only in the palate and upper jaw: it forms a great number of lamellæ, even fo many, according to Hunter, as 300 on each fide of the mouth. Thefe are of various fizes and lengths. Towards the interior of the mouth they are very fhort, about fix inches; and become gradually wider and longer, as they approach the pofterior and outer part of the palate and jaws: the moft external laminæ in the large *whale-bone whale* are ftated by Hunter as meafuring 12 or 15 feet long, and 15 inches broad. According to Cuvier, they meafure 10 feet long. All the plates are placed tranfverfely, with refpect to the line of the body, and growing downwards, their unequal lengths give the palate and upper jaw the figure of a vault, or the interior of the roof of a houfe.

The plates of *whale-bone* are always found to terminate in a number of long fibres or hairs. This has hitherto been confidered the effect of a mechanical divifion of the end of the plate from ufe; but thefe fibres are, at leaft when firft formed, round and fmooth, and of a thicknefs in fome degree proportioned to the fize of the lamina to which they belong, which makes it probable that the interior part of the plates confifts of round fibres agglutinated into one mafs, fomewhat in the manner of the horn of the *rhinoceros*. The fuperficies of the plates of whale-bone is fmooth, and appears to have a lamellated form.

The laminæ of whale-bone are hollow at their root, and are penetrated for fome way by pulps, in the fame manner as hairs. The interior parts of the whale-bone are fecreted by the pulps, and the external layer by the fame vafcular fubftance extended upon the jaws. This likewife fecretes a whitifh horny fubftance, which furrounds and fills the interfpaces of the bafis of the plates.

Both the plates and the intermediate fubftance are worn by ufe, and renewed by a continual growth. The external part of the plates very foon, (or rather, we believe, immediately upon their protrufion.) breaks off in fcales, and expofes the fibrous or hairy appearance at the extremity of the plates As the hair wears, more of the external part of the plate gives way, fo that the end of the plate that is turned towards the mouth always terminates in loofe fibres.

The white intermediate fubftance, when it grows as high as the edge of the fkin of the jaw, becomes foft, and decays away like old cuticle.

The *third defcription of teeth*, or thofe exclufively intended for *weapons*, ufually occupy the fituation of the canine or lacerating teeth. They are peculiar to fome of the large quadrupeds with feveral hoofs, or the *multungulata*, to two of the genus *trichecus*, and to the *narwhal*. Naturalifts have fo often defcribed the form of thefe defences, that it is unneceffary to repeat the account of it here.

The interior fubftance of the *tufks* has been diftinguifhed by the name of *ivory*: its compofition is fomewhat different from the bony part of teeth in general. In the *elephant* the ivory is lefs hard than in other animals; it likewife becomes fooner yellow on expofure to the air: it is marked by many curved lines, which run from the centre to the circumference of the tufk. The cortical part in the *elephant* is fmooth and harder than the reft of the tufk. Cuvier believes it poffeffes a thin layer of enamel; but in our opinion, the fuperficies of the tufk is crufta petrofa.

In the *hippopotamus* the fubftance of the tufks is hard, and regularly ftriated. There is a moderately thick layer of fine cryftalline enamel on the fore part of the tufks.

The ivory in the tufks of the *fus æthiopicus*, Cuvier ftates to be nearly fimilar to the preceding. In the common *boar* there are no ftriæ to be obferved, but fometimes layers of a brown fubftance.

The maffy tufks of the *morfe* are very denfe in their ftructure, and want the ftriated appearance. The middle part of the tufk is formed of little round grains, not arranged in any order, but like the ftone called *pudding-ftone*. The ivory of the *dugong* has a uniform compofition.

The fingular teeth, or horns, as they are fometimes called, of the *narwhal*, have appeared to us to confift of an offeous fubftance throughout, which is fimilar to the crufta petrofa of the teeth in quadrupeds. The fuperficies is polifhed, as it would feem, by friction. The fpirally grooved appearance of thefe teeth it is very difficult to explain, either with refpect to its production or its ufe.

All the tufks of mammalia appear to continue to grow during the animal's life. The cavity in the root remains of a confiderable fize, and is always filled by a vafcular pulp. The protracted growth of this fort of teeth has produced fome effects that have been made ufe of as arguments for the exiftence of vafcularity and organic actions in the earthy fubftances of the teeth. Thus, feveral inftances have been difcovered of balls, fpear-heads, &c. being lodged in the tufks of *elephants*, and being furrounded by offeous matter, evidently depofited in confequence of inflammation. In all the

the cafes of this kind which have come under our obfervation, the offific depofit appeared to have been made from the interior of the tufk, and no doubt was the confequence of an injury to the pulp; indeed we cannot conceive that it could poffibly be effected in any other manner. To fuppofe that the offeous fubftance of teeth is capable of being inflamed by a mechanical injury, is abfolutely inconfiftent with the very purpofes for which teeth are defigned, not to fay that it is contrary to fome particular facts and experiments. Teeth actually exhibit no morbid actions, either in confequence of injury, conftitutional difeafes of the bones, or the gradual decline of the vital powers. They wear, like any inorganic fubftance, by friction, and what is called their *caries* is a change in the interior arrangement of their particles, commencing on the furface, and proceeding in a manner perfectly fimilar to the decay of artificial teeth, when placed under fimilar circumftances. The pain of tooth-ache depends upon an affection of the pulp, a part extremely fufceptible of difeafe, either in confequence of external influence, or of conftitutional derangement. The irregular and exuberant depofits of offeous matter are made by the fame parts which produce the natural tooth. Thus, the internal membrane of the oyfter, when wounded, is excited to a more copious and irregular fecretion, and thofe excrefcences called pearls are formed. For a more detailed difcuffion of the queftion of the vafcularity of the teeth, we fhall refer the reader to the article TEETH. *Plate* I. of the *Anatomy of Mammalia*, is explanatory of the ftructure and growth of the teeth. *Fig.* 1. fhews a grinder of the *fheep*; *a* is the crown of the tooth polifhed, in order to expofe more diftinctly the crefcentic form of the enamel which penetrates the body of the grinder, and the dark coloured cavity left in the centre. *Fig.* 2. exhibits the grinding furface of the molar tooth of the *horfe*, polifhed: *a* indicates the zig-zag line, formed by the enamel in the interior of the tooth; *b* is the crufta petrofa; *c*, the hole. *Fig.* 3. fhews the grinding furface of the molar teeth of the *African elephant*, in a certain degree worn down; *a*, *a*, *a*, point out the lozenge figures of the denticuli, the fides of which are clothed with enamel; *b b b* refer to the crufta petrofa, a cement which is interpofed amongft thefe denticuli. *Fig.* 4. is the molar tooth of the *cape ant-eater* (*orycteropus*) divided longitudinally, and worn upon the crown: *a*, the lateral view of the tubular ftructure of the tooth; *b*, the appearance of pores upon the end of the tooth. *Figs.* 5 and 6 reprefent the horny fhells, which exift in place of offeous teeth in the *ornithorhynchus paradoxus*. *Fig.* 5. fhews the external furface, and *fig.* 6. the furface by which the tooth is connected with the gums. *Fig.* 7. is the capfule of a grinding tooth in the *calf*, laid open on one fide; *a*, *a*, the parietes of the capfule; *b*, *b*, the proceffes of the pulp, feen paffing upwards, the fhell of the tooth having been removed; *c*, *c*, the proceffes from the capfule which fecrete the enamel and crufta petrofa, paffing downwards. *Fig.* 8. exhibits the lower jaw of the *rat*, divided in a vertical direction, in order to bring into view the courfe and manner of growth of the gnawing tooth; *a* is the jaw-bone; *b*, the gnawing tooth, alfo divided, to expofe the cavity into which the pulp paffes, and remains always of a confiderable fize, for the purpofe of affording a continual fupply of offeous matter. The root of this tooth is feen to be lodged in a canal, extending below the molares to the back of the jaw. *Fig.* 9. is a large grinder of the *Afiatic elephant* divided vertically: *a a a* indicate the offeous part of fome of the denticuli; *b b b* the enamel with which they are covered; *c c c* the crufta petrofa, filling the interfpaces between the denticuli; *d* points to the fore-part of the tooth, which is worn down; *e*, the fangs of the anterior denticuli, nearly abforbed; *f*, *f*, the middle and back parts of the crown of the tooth, with the crufta petrofa entirely enveloping the ends of the denticuli; *g*, the fangs of the pofterior denticuli, not fully formed, that portion of the teeth not yet having been brought into ufe. *Fig.* 10. exhibits a lateral view of one of the plates of *whale-bone* in the *Balæna roftrata*: *a* is the part of the plate which projects beyond the gum; *b*, the portion funk in the gum; *c*, the white fubftance that furrounds the whale-bone and forms a projecting bead, and alfo paffes between the plates to produce their internal lamellæ; *d* is the part analogous to the gum; *e*, a flefhy fubftance, covering the jaw-bone, on which the inner lamellæ of the plate are formed; *f*, the fibres in which the lamellæ terminate.

The *tongue* of mammalia, as far as it is concerned in the acts of maftication and deglutition, does not differ materially from the fame organ in the human fubject, except in the *ant-eaters* and the *cetacea*. The former have the tongue very long, projectile, and furnifhed with fome fingular mufcles for its protrufion and retraction: the latter have the tongue fhort, flat, and very limited in its motions even in the mouth, in which circumftance the *cetacea* refemble fifhes, as might be expected from their having fimilar modes of feeding.

Cuvier has thus defcribed the mechanifm of the tongue in the *porcupine ant-eater* (*echidna*). The organ in this animal becomes fuddenly flender at the place where it arifes from the palate, and appears to be compofed afterwards of two very fmall and long mufcular cones, lying in contact with each other; their point is that of the tongue itfelf. Each of thefe cones confifts of two mufcles; the one external, compofed of a great number of little diftinct fafciculi, which encompafs in fo many circles or rings the internal mufcle. This laft is cylindric and very long. It arifes from the middle and fuperior part of the fternum, proceeds forwards the length of the neck, penetrates between two layers of the mylo-gloffus mufcle, next between two bands of the little portion of the genio-gloffus, and foon after enters the *annular mufcle* above defcribed. The internal longitudinal mufcle is compofed of diftinct fafciculi rolled fpirally upon themfelves. The moft fuperficial of thefe fafciculi terminate at the firft rings of the mufculus annularis. Thofe deeper feated end upon the next rings, and fo on with refpect to the other fafciculi, until they are all expended. The moft internal finifh at the tip of the tongue. The annular mufcles ferve to protrude the tongue by diminifhing its thicknefs; the longitudinal mufcles withdraw it into the mouth, and are likewife capable of turning it in every direction.

In the *echidna*, the *genio-gloffi* mufcles form the greateft part of the bafe of the tongue, but do not enter into the compofition of the elongated part, that proceeds from the palate. There is a kind of *mylo-gloffus* which has the fame attachments as the *mylo-hyoideus*. There is no *ftylo-gloffus* in the *echidna*.

The *common ant-eaters* have a tongue conftructed nearly like the preceding animal. There are a longitudinal and annular mufcle, which conftitute, as in the *echidna*, the elongated part of the tongue. The longitudinal mufcles arife from the enfiform cartilage of the fternum, which is broad and flat, to give them attachment. They pafs on the inner fide of the fternum, through the breaft, and upon the fides of the larynx and os hyoides, to reach the back of the tongue. They are enclofed in this paffage by a tendinous fheath, furnifhed by the genio-gloffus. Blumenbach found, in the *two-toed ant-eater*, the tongue $3\frac{1}{2}$ inches long, and not larger than a crow's quill at the root. It was cylindrical, and faintly

marked

marked with a groove along the ſuperior ſurface. He ſtates that the uſual muſcles of the tongue, particularly the *genio-gloſſus*, were very ſtrong.

According to Cuvier in the *dolphin* (*delphinus delphis*) the *ſtylo-gloſſi* muſcles ariſe from the ſuperior and anterior edge of the ſtyloid bone. The *hyo-gloſſus* comes from the middle of the convexity of the body of the os hyoides. There is but one *mylo-gloſſus*, the fibres of which proceed obliquely backward and inward, from the anterior circumference of the lower jaw towards the tongue.

There is a curious tendinous faſciculus under the tongue of the *dog*, which is popularly known by the name of the *worm*. It lies in a kind of membranous ſheath, and has no connection, like other tendons, to any muſcle.

Caſſerius thought it was uſeful to the dog in the peculiar method of taking liquids by *lapping*, and Blumenbach is inclined to agree with him in this opinion, from finding the ſame ſort of tendon under the tongue of an *opoſſum* he had obſerved to drink, by lapping as dogs do.

A very dangerous notion has been entertained ſince the days of Pliny, that removing the worm from the tongue of a dog will prevent the animal becoming afterwards mad. Another opinion, which is probably as ill founded, is that dogs which have been wormed, if they ſhould be affected with hydrophobia, will not ſhew any diſpoſition to bite. The credulity which has always prevailed reſpecting the mode of preventing and of curing this diſeaſe, has been attended with the moſt miſchievous effects in ſuperſeding the only rational means of ſecurity.

The tongue, as an inſtrument of manducation, is very actively employed. Its muſcles give it the power of moving in every poſſible direction, and therefore of conveying the food from any one part of the mouth to another; it places the unbroken aliments between the grinding teeth; retains them there until they are ſufficiently divided; and then carries them into the pharynx to be ſwallowed. The performance of theſe actions requires a nice feeling in the tongue, which it is known to poſſeſs in an eminent degree. Beſides being an organ of taſte, the tongue has a more diſcriminating touch than any other part of the body, and hence it is employed by jewellers and other artiſts in aſcertaining properties that would eſcape the examination of the other ſenſes

The ſpiculæ upon the ſurface of the tongue in many quadrupeds are calculated to improve the prehenſile powers of this member in a great degree. In the *cat* genus theſe are horny proceſſes, which are ſo ſharp and ſtrong, that they will tear off the ſkin in licking it. Many of the *herbivorous* quadrupeds, likewiſe, have the tongue armed with proceſſes, which are ſerviceable in tearing up their food. The horny proceſſes on the back of the tongue of the *ornithorhynchus* ſhould perhaps be claſſed with the papillæ of that organ, inſtead of being placed amongſt the teeth.

Fig. 11. in *Plate* I. of the *Anatomy of Mammalia*, repreſents the peculiar muſcles of the tongue in the *echidna*: *a* is the *mylo-hyoideus* muſcle; *b* its aſſiſtant portion; *c*, a part of the *genio-hyoideus*; *d*, the *genio-gloſſus*, with its additional portion, *e*, are turned aſide; *f* is the inferior layer of the *mylo-gloſſus*, ſeparated from the palatine membrane, by which the ſuperior layer of this muſcle is ſeen at *g*; *h h h* indicate the *ſterno-gloſſus*, terminating in ſucceſſive faſciculi in the muſculus annularis; *i i i* ſhew the annular muſcle partially expoſed, and at one place cut and turned back to expoſe the ſterno-gloſſus paſſing through it; *k* is the membrane covering the tongue.

The *ſalivary* glands are the ſame in number, with a very few exceptions, in mammalia as in the human ſubject. The *buccales* and *labiales*, however, are often hardly perceptible. The ſtructure of the ſalivary glands is eſſentially the ſame in all caſes; we have only to point out ſome varieties in the relative ſize of the glands, to notice thoſe inſtances where one or all of them may be abſent, and to deſcribe ſome auxiliary glands which exiſt in a few ſpecies.

The ſalivary ſyſtem is leſs ſtriking in the *carnivorous* quadrupeds, than in thoſe that conſume vegetable food. The *parotids* are diminiſhed in particular, being generally as ſmall as the ſub-maxillary glands, and ſometimes even ſmaller; as may be obſerved in the *bat*, the *dog*, and the *American opoſſum* (*didelphis virginiana*). The texture of the ſalivary glands alſo is firmer, and their colour more red in the *carnivorous* than other quadrupeds.

The *ſublingual* glands are not found in the *cat*, and in the *dog* they are but the prolongation of the *ſub-maxillary*.

The *molar* glands, which are ſo ſmall and obſcure in man, are often very plain, and indeed conſiderable in quadrupeds. In the *cat* they form a cloſe oval maſs. In the *dog* they make an uninterrupted ſeries, extended oppoſite the inferior molar teeth. In this animal there is a ſalivary gland, alſo ſituated in the zygomatic foſſa; it is half the ſize of the ſub-maxillary gland: it aſcends as far as under the globe of the eye: its duct, which is very large, deſcends behind the ſuperior jaw, and opens into the mouth, at the extremity of the alveolar border of the ſuperior maxillary bone.

The *ſaltigrade* mammalia have the ſalivary glands larger than the *carnivorous* or *digitigrade*, but, like them, the glands which pour out their fluid into the front of the mouth exceed the *parotids* in ſize.

The *tardigrade* mammalia have the parotids ſmaller than the ſub-maxillary glands.

There are greater varieties to be obſerved in the ſalivary ſyſtem of the *edentata* than in that of any other tribe of mammalia

In the *two-toed ant-eater*, the *ſub-maxillary* glands are of great ſize, they form a cone-ſhaped maſs, which covers the fore-part of the neck, and the top of the breaſt. They are ſunk in between the mammæ, oppoſite the ſternum, and extend forwards as far as the larynx. They then proceed upon the ſides of the neck, and aſcending round the ears furniſh a narrow proceſs, which paſſes forwards between the maſſeter and mylo-hyoideus muſcles. Although this gland ſeems to be only one maſs, it appeared to Cuvier, from whom this account is borrowed, to have two principal excretory ducts, which inſinuate themſelves along the edge of the mylo-hyoideus, and accompanying this muſcle on each ſide as far as behind the arch of the chin, where they open into the mouth. Cuvier, however, ſpeaks doubtingly of this deſcription, as the ſubject from which it was taken had not been well preſerved.

The *molar* glands in the ſame animal are united into one long maſs, covered by the buccinator muſcle.

The *ſublingual* are formed of glandular grains diſpoſed in a ſeries under the membrane of the mouth, the length of the genio-gloſſi muſcles.

The *parotids* appear to be replaced by the ſuperior part of the glandular maſs already deſcribed as the ſub-maxillary glands.

Another ſalivary gland, which from its ſituation in ſome quadrupeds might be called the *zygomatic*, or *temporal*, alſo exiſts of a large ſize in the *two-toed ant-eater*. It is contiguous inferiorly to the upper edge of the maſſeter muſcle: poſteriorly and above, it correſponds to the temporal muſcle, and it embraces anteriorly the globe of the eye. The ſubſtance

ſtance of this gland is more compact than that of the parotid: its duct opens behind the ſuperior maxillary bone.

There is, laſtly, a gland in the *ant-eaters*, the uſe of which is probably to furniſh a mucus to the tongue, that is neceſſary for detaining the inſects on which theſe quadrupeds ſubſiſt.

This gland is of an oval flattened figure, and deſcends before the tendon of the maſſeter, behind the angle of the lips, and then along the border of the lower lip, as far as the middle of it. The excretory duct of this gland opens externally in a groove at the commiſſure of the lips. When the gland is preſſed, there iſſues from this orifice a white thick adheſive matter, which, no doubt, is deſtined for the uſe already mentioned.

In the *porcupine ant-eater*, (*echidna*,) the *ſub-maxillary* glands are extremely large. They extend far backwards. The lobes of which they are formed are very diſtinct, and the ſmall excretory ducts of the glands are ſeen to terminate by plain orifices in a principal duct, the diameter of which is very conſiderable. The chief duct proceeds in the direction of the axis of the gland, upon the muſcles which go to the tongue, and penetrates the membrane of the mouth very near the ſymphyſis of the jaw.

There are alſo in the *echidna* two *ſublingual* glands, of an oval form, ſmaller than the ſub-maxillary, and with more compact lobes. They are ſituated behind the membrane of the mouth, on each ſide of the baſe of the tongue, and pour out their ſecretion through a number of ſmall foramina at that place.

In the *multungulata* the ſalivary ſyſtem is extenſive. The *pig* has two *ſublingual* glands. The firſt is very narrow and long, compoſed of little lobes of a pale red colour, and accompanies the duct of the ſub-maxillary gland from the angle of the jaw as far as the ſecond ſublingual gland, and opens by one ſmall orifice. The other ſublingual gland is placed anterior to this; it is ſquare, flat, and compoſed of lobes of a larger ſize, and a redder colour, than thoſe of the firſt ſublingual gland. It has eight or ten excretory ducts, which perforate the membrane of the mouth in a row.

The *molar* glands of the *pig* are two long maſſes, which are of a reddiſh colour, and conſiſt of large lobules, like the ſecond ſublingual of this animal.

In the *biſulca*, or *cloven-footed* quadrupeds, the ſalivary glands are of a great ſize, particularly thoſe which are ſituated poſteriorly with reſpect to the mouth.

In the *ox* and *ſheep* there is a cluſter of glands in the zygomatic foſſa, which extends as high as the globe of the eye, and deſcends below the zygoma, under the maſſeter. Its excretory ducts open behind the laſt molar tooth.

The *zygomatic glands* in the *horſe* are the continuation of the molars, which aſcend behind the upper jaw to near the abductor of the eye. The *parotids* in the *horſe* are very large, paſſing upwards behind the external ear, and downwards as far as the angle of the jaw.

In all thoſe animals that inhabit the water, the ſalivary glands are either very ſmall, or abſent altogether. In the *common ſeal*, the *parotids*, the *ſublingual*, and the *zygomatic* glands are wanting. There are two *ſub-maxillary*, the one is larger than the other, and they have a common excretory duct, which opens as uſual under the frænum of the tongue.

In the *cetacea* there is no veſtige of ſalivary glands.

From the preceding deſcription it will be ſeen the relative and abſolute ſize of the ſalivary glands depend upon the uſe that is made of the teeth. When a ſpecies of food is taken that requires much maſtication, the glands that pour their ſaliva into the ſides of the mouth are particularly large. When the food is of a kind that needs but little diviſion, the ſalivary glands are ſmaller, eſpecially thoſe which furniſh their fluid to the grinding teeth. In the *whale tribe*, which do not maſticate at all, the ſalivary ſyſtem is unneceſſary, and accordingly does not exiſt. The great ſize of the ſalivary glands of the *inſectivorous* quadrupeds would ſeem to be an exception to general rules, but it is to be remarked that in theſe animals the ſalivary glands immediately ſubſervient to maſtication are wanting. The great bulk of the others may, therefore, be neceſſary for entangling and detaining the ants upon the tongue, and facilitating their paſſage into the œſophagus.

No accurate or comparative examination has yet been made of the chemical properties of the ſaliva of quadrupeds, but the ſtructure of the glands being ſimilar, it is probable that the fluid they ſecrete does not differ materially from the ſaliva of the human ſubject.

In ſome mammalia, there are dilatations of the internal membrane and integuments of the mouth in which the food is depoſited for a time previous to its being ſwallowed, and in which it is ſoftened by maceration in the ſaliva. Theſe cavities have received the names of *cheek pouches*, and *jaw ſacs*.

A great number of ſpecies of *monkey* poſſeſſes cheek pouches. They are not large, and the openings into the mouth are nearly as wide as the ſacs themſelves Being ſituated oppoſite to the inferior molar teeth, they are well ſupplied with ſaliva from the parotids. When they are empty, the face of the monkey looks thin and ſunken.

The *macerating pouches* connected with the mouth are much larger in the *hamſter* (*mus cricetus*), and ſeveral other ſpecies of *mus* allied to the *hamſter*. The moſt remarkable pouches, however, are found in the *Canada rat*, (*mus burſarius*,) a ſpecies deſcribed by doctor Shaw in the 5th vol. of the Linnæan Tranſactions. He has diſtinguiſhed it by a ſpecific name expreſſive of its enormous pouches. In the figure he has given of it, the pouches are ſeen to hang down like two oval bags from the jaws, each of them equalling the ſize of the whole head.

Where the macerating pouches are large, they are ſaid to be uſed for carrying the animal's food to their habitations, in which they depoſit a winter ſtore.

Pouches which appear ſtrictly for macerating, have been deſcribed by Mr. Home in the *ornithorhynchus paradoxus*.

In *Plate* II. of the *Anatomy of Mammalia*, *fig.* 1. repreſents a front view of the head and ſhoulders of the *mus burſarius*, with its enormous pouches diſtended. The appearance of blood-veſſels ramifying upon them is to be ſeen.

The *pharynx* of mammalia reſembles in moſt particulars that of the human ſubject. Cuvier mentions ſome ſlight alterations in the direction and actions of the *ſtylo-pharyngeus* muſcle. He ſtates that in the *paca* this muſcle ſeems to be the continuation of the *ſtylo-maſtoideus*, and in the *elephant* it is united to the *ſtylo-hyoideus* as far as the top of the pharynx.

In addition to the uſual muſcles of the pharynx, many quadrupeds, particularly the *elephant*, *bear*, &c. have been obſerved to have the proper muſcles of the tube of the œſophagus continued upon the bag of the pharynx. Theſe layers Cuvier calls the *pharyngeus proprius*.

It is ſomewhat ſingular that the *uvula* is a part peculiar to *man* and the *monkey*.

The pharynx of the *whale* tribe is formed into two paſſages, by means of the curious larynx of theſe animals, which is elevated ſo high as to be inſerted into the aperture, correſponding in ſome degree to the poſterior nares. The ſtructure of theſe parts will be better underſtood after the deſcription of the larynx in the *whale*.

Œſophagus.—This tube in moſt mammalia has the muſcular coat formed of two layers, the fibres of which have a ſpiral direction; the external layer takes one courſe, the internal an oppoſite one; ſo that they always decuſſate each other. Some anatomiſts have ſuppoſed that theſe ſpiral muſcles were peculiar to the œſophagus of *ruminant* quadrupeds, although they were figured in the *dog* above a century ago by Blaſius. They have likewiſe been found by Cuvier in ſeveral quadrupeds, and by us in others, from which it would ſeem to be a tolerably general ſtructure in mammalia. The muſcular coat has been found to reſemble that of the human ſubject in the *kanguroo*, in which animal it is alſo thicker than the muſcular tunic of the reſt of the alimentary canal.

The œſophagus of mammalia, generally ſpeaking, is richly ſupplied with mucous glands.

The cuticular membrane is very plain in many quadrupeds, eſpecially thoſe that have the ſtomach partially lined with cuticle. There is a very ſtrong white cuticle in the œſophagus of the *whale* tribe.

The internal membrane of the œſophagus exhibits longitudinal folds in many quadrupeds. Cuvier has remarked, beſides theſe, ſome tranſverſe folds about the middle of the œſophagus in ſeveral *carnivorous* mammalia, as the *tiger*, *lion*, *lynx*, and the *Virginian opoſſum*, in all of which theſe folds are very ſtriking, forming a ſpecies of valves. They exiſt likewiſe, but in a ſlighter degree, in the *civet*, and in the *couguar* (*felis concolor*).

Theſe valves, or tranſverſe folds, are placed cloſe to each other. They do not include the whole of the circumference of the œſophagus; but there are uſually two or three which unite at an acute angle, in order to complete the circle.

The œſophagus of quadrupeds, in conveying ſubſtances into the ſtomach in a direction contrary to their gravity, exemplifies very clearly its functions in all animals. Its actions are always periſtaltic, like thoſe of the inteſtines. The ſucceſſive contraction and dilatation of the different parts of the canal are obviouſly ſeen when a horſe, or other long-necked quadruped, is drinking; the water does not paſs in a ſtream along the gullet, but in the form of globes, the muſcular fibres contracting behind them, as they paſs onwards. The œſophagus is, therefore, always in a comparatively collapſed ſtate, except at the very parts of the canal which contain the portions of food or drink.

The termination of the œſophagus is open and direct in the *carnivorous* quadrupeds, but in many of the *herbivorous*, particularly thoſe with complicated ſtomachs, it is contracted, or enters obliquely. The œſophageal orifice of the ſtomach in the *horſe* is diminiſhed by a projection of the tunics, which has ſomewhat the appearance, and, as it is ſuppoſed, the effect of a valve. This ſtructure is commonly believed to render the *horſe* incapable of vomiting. We are, however, well informed that *horſes* have been known to vomit when very active medicines have been employed. We believe, alſo, that it is equally difficult to excite vomiting in the *ruminant* animals, although they have the power of ſpontaneouſly bringing back the contents of the ſtomach into the mouth at all times. We muſt, therefore, ſeek for ſome other explanation for the indiſpoſition to vomit in theſe animals, than the mode in which the œſophagus terminates in the ſtomach. Shall we attribute it to the parts of the ſtomach adjoining the œſophagus being leſs ſuſceptible of ſtimuli, from being covered with cuticle? or is it that the medicines that have an emetic effect upon the human ſubject have a different operation upon them? It is a fact well known, that medicines have different, or even oppoſite effects upon different animals. The ſtomach of the *dog* is provoked to vomit by eating graſs.

A peculiar glandular and moveable bag has been deſcribed behind the palate in the *camels*, which is ſuppoſed to carry water for moiſtening their fauces. Cuvier ſtates it to exiſt only in the *dromedary*, in which it is thruſt forth on the neck in the rutting ſeaſon.

Stomach.—The hiſtory of this organ in mammalia forms one of the moſt intereſting branches of comparative anatomy. The varieties in its form and ſtructure, ſuited to the various kinds of food uſed by this claſs of animals, are highly inſtructive, and have been particularly inveſtigated as being applicable to the explanation of the functions of the ſtomach in man.

The moſt ſimple *form* of the ſtomach belongs to thoſe mammalia which ſubſiſt upon fleſh. In many of the beaſts of prey the ſtomach is nothing more than a ſlight dilatation of the alimentary canal. The cardiac or œſophageal end is larger than the pyloric, but there is no cul-de-ſac, or dilated part placed out of the courſe of the ſubſtances through the viſcus in which they can be detained. The beſt examples of the carnivorous ſtomach are found in the *pole cat*, and moſt of the genus *muſtela*, the *dog*, *hyæna*, *badger*, ſome of the genus *felis*, &c. In all theſe caſes the ſmaller curvature, as it is called, is ſlightly hollowed, the dilatation being entirely in the great or lower curvature, and chiefly, as before obſerved, at the left or cardiac end. In the *ſeal* the ſtomach has great reſemblance to that above deſcribed; the œſophagus forms even leſs of an angle with the ſtomach, but enters it at the end of the left extremity. The leſſer curvature is not concave, but nearly preſents a ſtraight line, and there is near the pylorus a degree of circular contraction.

The enlargement of the great end of the ſtomach, and the inſertion of the œſophagus ſomewhat nearer to the middle of the organ, is the firſt deviation of form to be obſerved. This figure is calculated to receive a larger quantity of food, and to retard in ſome degree its progreſs through the viſcus; we accordingly meet with it in thoſe animals that live upon a mixed food, or upon vegetable matters, either prepared by cooking, or ſome other means, to render them more digeſtible. This form of ſtomach exiſts in the *human ſubject*, in moſt of the *monkey* tribe, and of the *bats*, in ſome of the *plantigrade*, and many of the *ſaltigrade* mammalia.

The *orangs* reſemble man with reſpect to the form of the ſtomach more than any other of the *monkey* genus. Several of the other ſpecies differ in the degree of cul-de-ſac produced at the great end, by the ſituation of the œſophageal orifice, and ſome other immaterial circumſtances which are pointed out in Cuvier's Anatomie comparée, tom. iii.

In the *galeopithecus* the pyloric half of the ſtomach is prolonged ſomewhat in the form of an inteſtine.

In the *brown bear* the portions on each ſide of the entrance of the œſophagus are directed towards the diaphragm. In the *hedge-hog*, alſo, the pyloric and cardiac ends of the ſtomach turn a little towards the diaphragm.

In the *brown coati* the ſtomach reſembles in figure a pear, the pyloric end correſponding to the ſtalk, and the œſophagus being inſerted into the ſide of the fruit.

The Pariſian academicians deſcribed the ſtomach of the *lion* as being in the ſame direction as the œſophagus, until near the pylorus, when it turns upwards, or forms the ſmall curvature, in the ſame manner as frequently is ſeen in the ſtomach of fiſhes. The academicians alſo found ſome dilated parts or pouches in the *lion's* ſtomach, but theſe differed in form and ſituation in different individuals. In the figure given by Cuvier of the *lion's* ſtomach, it has the ſame direction, but wants the dilated parts obſerved by the academicians. The preparations we have ſeen of the ſtomach of the *lion* reſemble thoſe of the *common cat*, in which

which the cavity is larger than in the perfect carnivorous ſtomach.

The figure of the ſtomach is ſingular in the *garden ſquirrel* of Pennant (*myoxus nitela.*) It is that of a globe, at the top of which both the œſophageal and pyloric orifices are ſituated cloſe to each other. The tubes of the œſophagus and inteſtine are both ſmall compared with the ſize of the ſtomach.

The form of the ſtomach is alſo globular in the *cape ant-eater* (*oryčteropus*), but the part which leads to the inteſtine is a proceſs from the right of the upper part of the globular ſac: this prolongation has a very ſtrong muſcular coat.

In the *echidna* the ſtomach is large and has thin coats; the figure is oval; the cardiac and pyloric orifices are nearly at the two ends of the ellipſis: there is a ſlight oval enlargement at the origin of the inteſtines. The ſtomach is glandular near the pylorus, and the muſcles are diſtinct at the ſame place. The internal membrane is thrown into ſome fine rugæ at the cardia, and forms larger and more numerous folds near the pylorus, which make a kind of radiated fringe. The pyloric orifice is not diminiſhed by a circular fold, but the parietes of the ſtomach, which are thicker than thoſe of the duodenum, form a projection into the latter.

The moſt extraordinary form found amongſt the ſingle ſtomachs of mammalia belongs to the *ornithorhynchus paradoxus.* It reſembles a wine bottle, flat at the bottom, nearly ſtraight on the ſides, and tapering at the top. The œſophagus correſponds to the neck of the bottle. The duodenum ariſes from the part ſimilar to the top of the body of the bottle, and ſoon becomes about half as wide as the ſtomach, which is extremely ſmall in proportion to the reſt of the alimentary canal, and to the ſize of the animal.

The *rhinoceros* has an unuſual form of ſimple ſtomach. The cardiac portion is diſtinguiſhed from the pyloric by a permanent contraction of the ſtomach. The former is an elongated oval. The œſophagus enters at nearly midway between the great end and the contracted part. The pyloric portion has a globular figure. The inteſtine ariſes out of the centre of it, and in a direction towards the great or left end of the ſtomach. The *rhinoceros* affords a real inſtance of a diſtinction of two portions of the ſtomach, without any proceſs of the internal membrane forming a line of ſeparation.

Mr. Home has fancied that a diſtinction of the ſtomach into two cavities exiſts in all ſingle ſtomachs during life, by means of a permanent contraction of the muſcular fibres of the middle of the ſtomach.

The effect of ſuch an hour-glaſs contraction of the ſtomach would neceſſarily be to detain the food in the great end, either as a temporary or a preparatory reſervoir, neither of which are required from the nature and preparation of the food of thoſe animals which poſſeſs a ſimple ſtomach. Mr. Home's hypotheſis tends to reduce the complicated and ſingle ſtomachs to one kind, or claſs, and to break down all the diſtinctions eſtabliſhed by nature, to correſpond with the different kinds of food, and the various modes of its preparation.

It has frequently occurred to many experimental phyſiologiſts, and to ourſelves, to ſee the figure of the ſtomach in the living body, but a regular and conſtant diviſion into two portions by means of the muſcular coat has not been remarked. We have obſerved different parts of the ſtomach in a contracted ſtate: the muſcles near the pyloric act moſt ſtrongly, as might be expected, in order to propel the alimentary matters into the inteſtine, and the great end of the ſtomach is in general found moſt diſtended, as being the part in which the food firſt arrives, and, conſequently, is in ſome degree accumulated.

In many of the ſimple ſtomachs, the great end, or cardiac portion, is diſtinguiſhed from the pyloric by having a thinner muſcular coat: this difference of ſtructure is uſually accompanied by a larger capacity of that part. In ſome of theſe caſes, likewiſe, the cuticle of the œſophagus is continued over the cardiac portion of the ſtomach. Theſe facts prove the gradual approaches that are made in the ſtructure of the ſtomach from a ſimple digeſtive organ, to the additional functions of a preparatory reſervoir. The diſtinction of the ſtomach into two cavities, by means of ſtructure and the prolongation of the great end into a more perfect cul-de-ſac, are particularly well ſeen in ſeveral of the *rat* genus, and ſome other ſpecies of *ſaltigrade* mammalia.

In ſome of the laſt mentioned tribe, the ſtomach is even more decidedly divided into two cavities than in the ſpecies to which we have alluded.

The *hamſter* (*mus cricetus*), has the ſtomach formed of two cavities, the ſides of which are conjoined, and communicate together by an orifice, apparently about the width of the duodenum, in the ſame animal. The œſophagus belongs to the left cavity, but enters at the junction of the two. The cardiac cavity or portion firſt extends outwards, and then turns up at the part correſponding to the great end of the ſtomach. The pyloric half is of a more irregular ſhape, and has thicker coats than the firſt. When diſtended, it has, in a degree, a ſacculated appearance from ſome dilated parts of its parietes. The communication between the two ſides of the ſtomach is guarded by a fold, which is fringed upon the edge.

In the *water rat* the ſtomach is converted into two cavities, by means of a contraction ſituated a little to the right of the cardiac orifice, which is nearly about the middle of the ſtomach. The left or cardiac cavity is almoſt tranſparent from the thinneſs of its coats, ſhewing the diviſion of the ſtomach to be deſigned to produce the effect of a reſervoir.

The *ſhort-tailed rat* of Pennant (*mus arvalis*) has the ſtomach divided in the ſame manner as the *water rat.*

The *lemming*, or *Lapland marmot* of Pennant, and the *mus lagurus* of Pallas, have alſo two cavities: they are ſeparated in the latter animal by a very thick fold, that projects interiorly, and is fringed upon the edge.

The ſtomach of the *mole rat* of the Cape (*mus capenſis*), is curved upon itſelf, and the œſophagus opens near to the pylorus; it is alſo divided into two cavities by a ſemi-lunar fold, which is furniſhed poſteriorly by the internal coat.

In the *muſk rat* (*mus zibethicus*), there is a contraction of the middle of the ſtomach, by which two cavities are formed.

The *mus aſpalax*, and *mus œconomus*, have the ſtomach divided into three pouches. In the former there are two reflections of the internal membrane, which proceed from each ſide of the cardia. The one on the right is carried on throughout the whole circumference of the ſtomach. It has a denticulated edge, and there is a round gland in the moſt projecting part of its large curvature.

The ſtomach has a very ſingular conformation in the *kanguroo.* It is greatly elongated, and doubled twice upon itſelf. It reſembles very much the great inteſtine of the *horſe,* not only in figure and great extent, for it nearly fills up the abdomen, but in being divided into a great number of ſacculi by means of longitudinal muſcular bands, ſuch as exiſt upon the ſides of the colon. The œſophagus

gus enters the ſtomach at about $\frac{1}{6}$th of its length from the end of the cul-de-ſac. The cardiac end furniſhes two proceſſes; the external one has thick and glandular coats, while the other is ſmooth, whitiſh, and irregularly corrugated, like the reſt of the internal ſurface in the cardiac portion of the ſtomach. This appearance of the internal membrane is preſerved around the cardia, and in a part of the right portion where there are two long triangular bands. In the remainder of this portion, the inner ſurface is more grey, mucous, ſemi-tranſparent, uniform, and without rugæ. There are two appendices which ariſe beyond the middle of the pyloric portion, and are curved backwards, like two ſhort cæca. The muſcular coat forms a projection around the pylorus, by which it is much contracted, and the internal ſurface preſents an annular burr at the ſame place, which conſiſts of follicular glands. The muſcular coat of the ſtomach in the *kanguroo* has tranſverſe fibres going from the one longitudinal band to the other on the right portion, but on the left part of the organ there are only the longitudinal muſcles to be ſeen.

The ſtomach of the *kanguroo rat* is divided into two portions, not only by its figure, but a difference of ſtructure. The œſophagus opens at the place where the cardiac and pyloric cavities join, and there is a projecting fold which is continued from the œſophagus into the pyloric cavity, the deſign of which is evidently to conduct the food, under certain conditions, more immediately into the ſecond cavity. The whole ſtomach poſſeſſes longitudinal bands, which produce contractions in its parietes, but this ſtructure is particularly ſtriking in the cardiac half, which is thrown into numerous deep ſacs or pouches. The internal membrane of the left portion forms ſtrong longitudinal rugæ on the poſterior half of this cavity, and ſlight folds paſſing between ſome many-ſided areas on the reſt of the cardiac, and the beginning of the pyloric diviſion of the ſtomach. The remainder of the latter is ſmooth, and without rugæ internally. There is a narrow gland, which extends the length of the firſt diviſion of the ſtomach, and diſcharges its fluid through numerous ſmall orifices upon the internal membrane.

In the *daman* (*hyrax*), the ſtomach has two cavities. The firſt is nearly globular, and receives the œſophagus in its right ſide: the ſecond is pyriform, and has the pylorus at the top, where there is a ſtrong marked annular contraction. The part by which the two cavities are conjoined is very ſmall.

The *porcupine* has the ſtomach conſiſting of three globular pouches. One correſponds to the cardiac portion; another to the pyloric: and the third, a ſmaller pouch than either, is placed between the two firſt, juſt at the termination of the œſophagus. Interiorly there is a fold which proceeds from the right of the cardia, and ſeparates the left pouch from the two others. There is at the pylorus, on the ſide of the little pouch, a ſemi-lunar burr, compoſed of glands. The inteſtine and œſophagus are ſeen to ariſe cloſe to each other, ſo that the whole figure gives the idea of a heart with the large veſſels. The internal membrane is uniform throughout.

In the *vampyre bat*, the œſophagus, before it enters the ſtomach, is dilated into a large oval ſac, which communicates very freely with the cavity of the latter, and may therefore perhaps be conſidered as belonging to it. The ſtomach is long, reſembling, in ſome degree, the colon of an animal. The left end is turned upwards, and at the extremity is curved backwards. Mr. Home deſcribes this portion of the ſtomach as being divided into two dilatations, with a neck between them, the one having a rugous, and the other a ſmooth ſurface. The diſtance from the œſophageal orifice to the pyloric is more than two-thirds of the whole length of the ſtomach: it firſt proceeds to the right ſide, and then turns back upon itſelf; the reflected part is puckered, or thrown into ſacculi. The pylorus has a valve, which, when cloſed, will not permit air to paſs through it.

The *ſpectre bat* has alſo the dilatation at the termination of the œſophagus; but all the other ſpecies of *veſpertilio* appear to have a ſimple globular ſtomach.

We ſhall now proceed to the deſcription of ſome ſtomachs which are more complicated in their forms than any hitherto mentioned.

In the *Pecari*, or *Mexican hog*, there are two remarkable proceſſes from the cardiac portion of the ſtomach, which are turned downwards, and appear to render the cavity of three parts. There are ſeveral contractions dividing the pyloric portion of the ſtomach from the other. The cardiac portion is by much the larger. Daubenton has repreſented the ſtomach as being divided into a greater number of pouches or proceſſes than are deſcribed by Cuvier or Home.

In the *hippopotamus* the cardiac portion contains three pouches, two of which only appear on the outſide: the ſtomach then becomes long and cylindric, like an inteſtine, and terminates in a narrow appendix, which opens into the duodenum. There are many tranſverſe folds or valves in the firſt part of the cylindric portion. The internal membrane is hard and granular in this part, from the laſt valve and in the two larger pouches: beyond the valves it is ſmooth and folded; there are no folds in the appendix, but the muſcular coat of it is very thick, particularly around the pylorus.

The ſtomach is extremely complicated in the *tardigrade* quadrupeds, and approaches, in a conſiderable degree, the conformation of this organ in thoſe that chew the cud. In the *two-toed ſloth*, it appears, when viewed externally, to conſiſt of two cavities. The left is very large in proportion to the œſophagus and the inteſtines; is nearly ſquare in its figure, and exhibits, at leaſt upon the anterior part, three elevations, or dilated parts. When the ſtomach is laid open, theſe are found to correſpond to three cavities, or apartments, which are ſeparated from each other, interiorly, by projections of the coats. The left, or cardiac diviſion, of the organ in theſe animals ſhould, therefore, be properly conſidered as three cavities. The pyloric, or right diviſion of the ſtomach, is formed like an inteſtine, or rather, from its dilatation towards the middle, it reſembles the ſimple carnivorous ſtomach in its figure. It is much ſmaller than the left portion, under which it is curved in the direction from right to left. The firſt half of it has very thin coats. The remainder has them thicker, particularly about the pylorus, the orifice of which is much contracted. Theſe two parts of the right diviſion of the ſtomach are ſtated to be ſeparated by a ſemilunar fold. The firſt of theſe ſeems to be again divided by a little fold, finely denticulated upon the edge. The internal coat is different in the two portions. The firſt portion terminates in a little cul-de-ſac, which is ſeen anteriorly upon the right ſide of the firſt, or cardiac diviſion of the ſtomach, between two others. Theſe little appendices appear to be glandular.

The inner coat is ſmooth in both the cardiac and pyloric diviſions of the ſtomach of the *two-toed ſloth*: it appears even to be tendinous in the two firſt cavities, or pouches, of the cardiac diviſion.

In the *three-toed ſloth*, the appendix of the ſecond ſtomach is is much longer than in the preceding ſpecies, and is divided into three apartments by two longitudinal ſepta.

In both theſe ſpecies, the œſophagus, on entering the cardiac diviſion of the ſtomach, becomes connected with a canal, which arrives, by a circuitous courſe, in the pyloric, or right diviſion, into which it opens by a contracted orifice. The exiſtence of ſuch a communication as this would lead us to expect, that the *ſloths* had the power of ruminating; but Cuvier ſtates, that he found both diviſions of their ſtomach equally filled with ſome ligneous ſubſtances, reduced to a ſort of mould, or earth. We ſhall refer the reader for a more particular account of the ſtomachs of the *tardigrade* mammalia to Cuvier's Anatomie comparée, tom. iii. Daubenton Hiſtoire Naturelle, tom. xiii. and Wiedeman's Archives, vol. i.

We have next to deſcribe the ſtomachs of the *ruminating* quadrupeds. There are ſome differences to be obſerved between the ruminants with horns, and thoſe without. We ſhall firſt give an account of the ſtomachs of the horned ruminants, and as the moſt familiar example, take for this purpoſe the *ox*.

In this tribe of animals there are four ſtomachs, which fill up a great part of the abdominal cavity. The firſt ſtomach is called the *paunch*, (*rumen*, *penula*, *magnus venter*, *&c.*) It occupies the left ſide of the belly, and is larger in the adult than the three other ſtomachs taken together. It has an irregular globular figure. When laid open, it is found to be, in a certain degree, divided into three cavities, by means of two ridges, or projections of its coats, which croſs it obliquely. The upper hollow contains the mouth of the ſecond ſtomach, which is ſo large, that the two firſt ſtomachs ſhould, perhaps, be conſidered as parts of the ſame cavity. The reflections of the coats, which form the ridges above mentioned, contain, beſides the muſcular coat, ſome tendons. The edges of the ridges are, therefore, thick and rounded. All the muſcles of the paunch are particularly firm in their texture. The internal membrane is of a brown colour, and covered with ſtrong papillæ in moſt places. The edges of the ridges are ſmooth. There is a thick cuticle lining the paunch, which may be detached by maceration, when it is ſeen to have given a covering to each of the papillæ. The contents of the paunch are the vegetable matters imperfectly maſticated, and unmixed with any of the animal juices, or even the drink. It is in this ſtomach, therefore, that fermentation of green food is liable to occur. Many of the horned cattle have their body greatly diſtended by the extrication of air during this proceſs in the paunch. The only remedy is to plunge a knife into the left loin of the beaſt; when the paunch will be penetrated, and an immenſe quantity of air will ruſh out. This expedient, although apparently ſo deſperate, we believe, is never followed by any bad conſequence. It is generally in the firſt ſtomach, rarely in the ſecond, that the concretions of hair, or of vegetable fibres, or calcareous ſubſtances, are found. The *hair-balls*, occaſionally met with in the paunch of the cow, are licked off from the body. They are curiouſly interwoven, and ſometimes are covered with an earthy matter, which receives a fine poliſh. The balls found in the ſtomach of the *chamois* are compoſed chiefly of the fibres of the *ethuſa meum*, and are covered with a fine black incruſtation. The bezoar ſtones are earthy concretions, formed in a ſimilar manner. See Bezoar, in this Dictionary.

The ſecond *ſtomach* of the *ox*, which is called the *honey-comb bag*, the *bonnet*, and *king's-hood*, (*reticulum*. *cellula*, *&c.*) might be conſidered, if it were not for its internal ſtructure, as a globular appendage of the paunch: it is placed upon the right ſide of the former, with which it communicates very freely, as before-mentioned. The internal ſurface is elevated into thin folds, which unite to each other, ſo as to produce many-ſided meſhes, or ſuperficial cells. The ſides of the folds are grooved, and their edges denticulated. The area of the cells is papillated as the paunch, but with finer eminences. The ſecond ſtomach is lined by a continuation of the cuticle which covers the firſt. The muſcular coat is generally thicker and ſofter in the ſecond than in the firſt ſtomach.

The œſophagus opens at the junction of the firſt and ſecond ſtomachs, ſo as to be capable of communicating freely with the cavity of both, but the operations of ſwallowing and regurgitation are materially influenced by the actions of a muſcular groove, or channel, which is continuous with the tube of the œſophagus, and ultimately leads into the third ſtomach. This groove is formed by two muſcular columns, which proceed from the ſides of the œſophageal orifice. The right band, or column, extends the length of the ſuperior ſurface of the honey-comb ſtomach. The left runs within the edge of the opening from the firſt into the ſecond ſtomach, and is prolonged upon the left ſurface of the latter. Each of theſe columns paſſes round the orifice leading from the ſecond into the third ſtomach, decuſſating upon the inſide of it. The internal membrane, where it covers theſe muſcular columns, is thick and regularly plaited tranſverſely. The membrane, on the contrary, is very thin between the columns, and forms, in the concave part of the groove, ſome longitudinal folds. There alſo is in this ſituation a layer of muſcular fibres, which paſs behind the groove, and connect one border of it with the other. This channel is the chief characteriſtic of the ruminating ſtomachs. When a portion of food is to be re-conveyed to the mouth, it is received into the groove, which, by the contraction of its muſcles, approximates the two borders, and forms a perfect tube, and thus tranſmits the morſel into the œſophagus. Again, when rumination is finiſhed, and the morſel ſwallowed, the groove forms a tube, and conveys it into the third ſtomach directly. When the food and water are firſt received into the ſtomach, the ſides of the groove are neceſſarily open, but it is probable, at the ſame time, that the orifice of the third ſtomach is cloſed. The different actions of the groove are evidently ſubjected to the will of the animal, which is extremely curious, as it cannot be accounted for by any peculiarity in the anatomy of the part. The ſame ſyſtem of nerves and veſſels belong to the groove as to the ſtomach of other quadrupeds.

Mr. Home ſtates, that the food contained in the paunch is always dry, and that the water the animal drinks paſſes into the ſecond ſtomach, without mixing with the food in the firſt. The office of the honey-comb bag, therefore, ſeems to mix in a gradual and convenient manner the liquid and dry aliments. In this point of view, the firſt ſtomach is the receptacle of the meat; the ſecond, of the drink, which will appear ſtill more probable, after we have deſcribed the ruminating apparatus of the *camel*, &c.

The third ſtomach has received the names of *many plies*. (*echinus centipellio*, *omaſum*, *&c.*) This cavity in the *ox* is larger than the honey-comb bag, and reſembles in figure a hedge-hog rolled up, and thence one of its appellations. Its connection with the ſecond ſtomach is very contracted. The cavity is filled with thin folds, or reflections of its coats, which ariſe from the ſmaller curvature, and have few edges at the large curvature correſponding to the back of the hedge-hog. Theſe folds, or ſepta, are of unequal dimenſions. According to Mr. Home's obſervations there are twenty-four ſepta, ſeven inches broad; about twenty-three that are four inches broad; and about forty-eight of one inch

inch and a quarter in breadth. Thefe are arranged in the following order. A broad one, with one of the narroweft next it: then a narrow one, with one of the narroweft next it: then a broad one; and fo,on. Whatever paffes into the cavity of the third ftomach muft fall between thefe fepta, and defcribe three-fourths of a circle, before it can arrive at the orifice of the fourth ftomach, which is fo near the other, that the direct line between them does not exceed three inches. The many plies are covered with cuticle as well as the firft and fecond ftomachs: they are covered alfo with little granular papillæ. The many plies form a projecting valve at the orifice of the fourth ftomach, at which place the cuticle terminates.

The food that is found in the third, or plicated ftomach, is diftributed amongft the different fepta in a compreffed form. It has the confiftence of thick pafte, and a peculiarly unpleafant fmell.

The fourth ftomach is called the *red bag*, (*abomafum*, *falifcus*, *ventriculus inteftinalis*, *&c.*) It has an elongated pyriform fhape, fomewhat like the fimple digeftive ftomach of mammalia. According to Mr. Home, it meafures in the *ox* about two feet nine inches in length: its internal membrane has eighteen longitudinal plicæ (nine on each fide), beginning at its orifice, and extending about twenty-two inches in the cavity. They are four inches broad, and increafe very much the internal furface. Beyond thefe, the inner coat forms fome ferpentine, or zig-zag rugæ. The cavity is a little enlarged near the pylorus, where there is a glandular body, which blocks up the pylorus when the parts are in a contracted ftate.

The ftomachs of the other *ruminants with horns* differ very little from thofe of the *ox*. In the *deer*, the paunch has three projections, feen externally, which correfpond to as many dilatations of its cavity. In the *deer*, *fheep*, and *antelope*, the papillæ, and other eminences of the inner coat of each of the ftomachs, are lefs eminent than they are in the *ox*.

The ftomachs of the *camel*, although agreeing in many refpects with thofe above defcribed, differ in fome points materially. The beft defcription of thefe ftomachs has been given by Mr. Home, from which we fhall chiefly borrow the prefent one.

The paunch of the *camel* is divided into two compartments, on its pofterior fide, by a prominent ridge, or column compofed of mufcle, which paffes down from the right fide of the orifice of the œfophagus. This column forms one fide of the groove that proceeds from the cardia to the orifice of the fecond ftomach, and it is continued beyond that to the lower part of the paunch. Beneath the orifice of the fecond ftomach the column fends off, at right angles, from its left fide, eight ftrong mufcular bands, which afterwards form curved lines, till they are infenfibly loft in the coats of the ftomach. Thefe are at equal diftances from each other, and being interfected, in a regular way, by tranfverfe mufcular fepta, form the mufcular parietes of a number of large cells, fituated on the left fide of the back of the paunch. There is a feries of twenty-one fmaller cells of the fame kind, which extend towards the right fide of the paunch. They commence on the right of the chief mufcular column, but have no connection with it. On the left fide of the termination of the œfophagus, a broad mufcular band has its origin from the coats of the firft ftomach, and paffes down in the form of a fold parallel to the great ridge already defcribed, and with it forms the groove as far as the entrance of the fecond ftomach. After entering this cavity, it takes a new direction, paffing along the upper edge of it, and terminates within the orifice of the third ftomach.

The orifice of the fecond ftomach is at right angles with the fide of the paunch: it is nearly clofed when the mufcular band, which paffes through it, is not in action. It is a pendulous bag, in which there are twelve rows of cells, formed by as many ftrong mufcular bands, paffing in a tranfverfe direction, and interfected by weaker mufcular bands, fo as to form the orifices of the cells. Above thefe cells, and between them and the mufcle which paffes along the upper part of the ftomach, is a fmooth furface extending from the orifice of this ftomach to the termination in the third.

The fecond ftomach of the *camel* neither receives the folid food in the firft inftance, as in the *ox*, nor does it afterwards pafs into its cavity or cellular ftructure. The food goes firft into the general cavity of the firft ftomach, and that portion of it which lies in the recefs immediately below the entrance of the œfophagus, under which the cells are fituated, is kept moift, and is readily returned into the mouth, along the groove formed for that purpofe, by the action of the ftrong mufcle, which furrounds this part of the ftomach, fo that the cellular portion of the firft ftomach in the *camel* performs the fame office as the fecond in the *ruminants with horns*. While the *camel* is drinking, the action of the mufcular band opens the orifice of the fecond ftomach, at the fame time that it directs the water into it; and when the cells of that cavity are full, the reft runs off into the cellular ftructure of the firft ftomach immediately below, and afterwards into the general cavity. It would appear that *camels*, when accuftomed to go journies in which they are kept for an unufual number of days without water, acquire the power of dilating the cells, fo as to make them contain a more than ordinary quantity as a fupply for their journey; at leaft fuch is the account given by thofe who have been in Egypt.

When the cud has been chewed, it has to pafs along the upper part of the fecond ftomach before it can reach the third. How this is effected, without its falling into the cellular portion, could not from any infpection of dried fpecimens be afcertained; but when the recent ftomach is examined, the mode in which this is managed becomes obvious. At the time that the cud is to pafs from the mouth, the mufcular band contracts with fo much force, that it not only opens the orifice of the fecond ftomach, but, acting on the mouth of the third, brings it forwards into the fecond, by which means the mufcular ridges that feparate the rows of cells are brought clofe together, fo as to exclude thefe cavities from the canal through which the cud paffes.

It is this very curious mechanifm which forms the peculiar character of the ftomach of the *camel*, *dromedary*, and *lama*, fitting them to live in the fandy deferts, where the fupplies of water are fo precarious.

The third *ftomach* of the *camel* is very fmall, and quite unlike that of the *ox*. It is nearly fpherical; four inches in diameter; is not lined with cuticle; nor has it any fepta projecting into it. It has a honey-comb appearance upon its internal furface, but this is fo flight as to require a clofe infpection to perceive it. This ftomach anfwers the purpofe of retarding the progrefs of the food, and making it pafs by fmall portions into the fourth cavity; effects which are produced by the leaves of the many plies of the *ox*, in a more perfect manner.

The fourth *ftomach* of the *camel* has, for a great part of its length, the appearance of an inteftine; it then contracts partially, and the lower portion has a near refemblance in its fhape to the human ftomach.

The whole length is four feet four inches: when laid open, the

the internal membrane of the upper portion is seen to be thrown into longitudinal narrow folds, which are continued for about three feet of its length: these terminate in a welted appearance: the rugæ are large, as in the *ox*, but not so prominent, nor so serpentine in their course; and for the last nine inches the membrane has a villous appearance, as in the human stomach. Close to the pylorus there is a glandular mass of a conical shape, the larger end of which rests upon the orifice of the pylorus. The same gland exists in the *ox*, but it is not so conspicuous as in the *camel*. The aperture of the pylorus is also diminished, by the usual annular projection of the coats. Immediately succeeding the pylorus, there is a very considerable globular dilatation, appearing like a fifth cavity of the stomach. The duodenum arises abruptly from one side of it.

The description given of the stomachs of the *dromedary* by the Parisian dissectors, is so very brief and imperfect, that scarcely any knowledge can be obtained from it. They describe the four stomachs as succeeding each other in nearly the same line. The third as being very long, and the second as containing about 20 cells for holding water.

Cuvier has given a very excellent description of the ruminating stomachs of the *lama*, as he found them in an individual that had been born dead. The age is very necessary to bear in mind, as the size and even internal structure of the different cavities of the ruminating organs are much influenced by it. Thus, before the *calf* or *lamb* begins to feed upon grass, rumination cannot be performed; the milk passes immediately into the digestive stomach, the groove always forming itself into a tube during the act of deglutition; the paunch is small, and the fourth stomach large in relation to what it afterwards becomes, and the cells and other eminences of the two first stomachs are comparatively slight.

In the *young lama* dissected by Cuvier, the *paunch* had an irregular globular figure, being elevated upon some parts, to correspond with pouches or dilatations interiorly. It was larger than all the other three stomachs together; two of the pouches contained square water-cells, similar to those of the *camel*; one pouch had six rows of cells, each containing about 12, which could be discovered externally, by some swellings of the coats. The other pouch had only five similar cells. Between this pouch and the cardia, there was a third dilatation, which was the smallest of all, and exhibited some folds upon its inner surface, but no cells. The remainder of the inner coat of the paunch had some irregular folds, which, however, generally lay in the direction from before backwards.

The second stomach, placed anteriorly, and on the right of the paunch, was an oval bag, divided transversely by eight principal rows of cells, which were divided into smaller cells, and each of these terminated in a gutter grooved in a transverse direction, which was prolonged and lost in the paunch.

The channel leading from the œsophagus to the third stomach, was distinguished by a large fold, such as exists in the *camel*.

The third stomach was elongated and cylindrical; its internal surface exhibited some longitudinal folds, united to each other by transverse ones. These disappear towards the end.

The fourth stomach was not separated by any contraction. It was wider and shorter than the third, and turned backwards upon it. Its inner surface appeared villous, and presented on the posterior part some convolutions and irregular folds near the pylorus. A rounded glandular body projected into the cavity at the orifice of the pylorus, which it completely closed as a valve. Immediately beyond the pylorus the canal was dilated into a round sac, as in the *camel*.

From the preceding descriptions of the stomachs in the *camel* and *lama*, it will be seen that the chief distinctions in the ruminants without horns, are the second stomach being exclusively designed for a reservoir of water; the third being a sort of assistant digestive one: and from Cuvier's dissection of the *lama*, we may suppose the paunch of that animal is nearly as large before, as after rumination commences. These animals have long been known to carry a quantity of water in their stomach, which was only mixed with the food as occasion might require. This water is retained in the cells already described, by means of the muscular fibres surrounding their orifices, contracting so as to close the cells. The *camel*, it is said, will not drink every day, but when it does, it takes in between seven and eight gallons of water. All that found in the cells of the second stomach is perfectly pure and limpid, and hence it is, that the animal is sometimes killed when travelling in the deserts, for the sake of the water in its stomach.

The stomachs of the *southern lamantin*, and of the *cetacea*, are as complicated as those of the ruminant animals, although they do not perform the same office.

In the *southern lamantin* (*trichecus australis*), there are properly two stomachs with appendages from them. The first is globular in its figure, but longer in the transverse direction than any other. It receives the œsophagus into the middle of its anterior part. The internal membrane of this stomach is villous, and it has its cavity divided into two at the anterior part, by a fold which is on the right of the cardia. There is a little process or appendix from the side of the first stomach, the orifice leading into which is so small, that no food can pass into it. This process discharges a liquor into the stomach, and should therefore be considered as a gland. The second stomach is smaller than the first, and of a long shape; it gives origin at its commencement to two little processes; the one superior, the other inferior. The internal membrane is villous, and slightly corrugated transversely.

Anatomists are not agreed as to the number of stomachs in *cetacea*. Cuvier and Blumenbach reckon four. Hunter, on the contrary, described five in the *porpoise*, *grampus*, *dolphin*, and *piked whale*, and seven in the *bottle-nosed whale*. This difference arises from the manner in which the parts are considered, and not upon any errors of observation; perhaps it would be still more proper to view the two first cavities as the first and second stomachs, and the subsequent ones as belonging to the intestinal canal.

The first cavity in the *porpoise* is a large oval bag, into the top of which the œsophagus opens. It is lined with a thick cuticle. The other opening of this bag is near the œsophageal orifice, or, as one might state it, in the shoulder of the bag, the œsophagus constituting the neck. It seems not improbable, from the vicinity of these two apertures, that food may, under some circumstances, pass from the œsophagus directly into the second stomach. The communication of the first and second stomachs is extended into a short canal, into which the cuticle of the first passes and abruptly terminates. This canal is corrugated in the longitudinal direction.

The second stomach in the *porpoise* is considerably less than the first, and situated on the right side of it. It is likewise an oval cavity, but dilated or rounded at the ends. It is divided upon the anterior part by a deep contraction, which leaves on the right the appearance of a distinct cavity. This portion is that which some anatomists have considered confidered as the third ftomach. The internal furface is in both thefe cavities fmooth and fpongy, without cuticle, and forms rugæ, which crofs each other at right angles.

The opening into the fourth cavity, or ftomach, as it has been confidered, is at the right fide of the bottom of the cavity laft defcribed, and is marked by a decided annular contraction, fimilar to a pylorus. The fourth cavity alfo refembles exactly an inteftine. It makes three ferpentine turns, and terminates in the lower fide of an oval fac, of an inconfiderable fize, which is the *fourth ftomach* of fome authors, or the *fifth* of others. The coats of this cavity are thin, fmooth internally, and tinged with bile, as it is into it, that the biliary and pancreatic ducts open, which is a ftrong reafon, in addition to the form of thefe parts, for confidering all, except the two firft ftomachs, as belonging to the inteftine. At the place where the contraction and projection of the coats inwards form the fecond ftomach into two cavities in the *grampus*, we have found two glandular maffes. They are like roundifh cakes in the coats; the one meafures about feven inches and a half in diameter, the other about four inches. There are fome ragged irregular depreffions upon the inner furface, correfponding to thefe glands, which appear to be the outlets of mucous follicles upon a very large fcale. The glandular cakes, therefore, probably take the place of the pyloric glands in other animals.

The projections of the inner coat in the ftomachs of the *whales*, are much more remarkable than in the *porpoife* or *grampus*; the rugæ are very eminent, and in fome there is a ftrong reticulation on the inner membrane that projects into folds, which are indented into each other.

In defcribing the ftomachs of fome mammalia, we have mentioned the exiftence of *cuticle* and *glands*, when thefe happened to have occurred along with other peculiarities. Thefe points of ftructure are, however, fo remarkable in other inftances, that they deferve a diftinct confideration.

The *cuticle* of the œfophagus is extended for fome way into the ftomachs of feveral of the *faltigrade* animals, generally covering a little more than the great end, and terminating by a prominent denticulated edge, as inftances of which we may mention fome of the *rat* kind. There is fome cuticle alfo in the ftomach of the *kanguroo*, the *common hog*, and the *pecari*. The cuticular covering of the great end exifts in all the *folipeda*, whofe ftomachs are otherwife very fimple in form and ftructure. It is obvious, that the portion of the cavity which is covered by cuticle, is incapable of performing any other function than that of a refervoir.

The *glands* that we have had occafion to notice in the preceding account of the digeftive organs, were generally fituated at the pylorus, and were not very remarkable as to fize; but fome mammalia have a glandular apparatus at the cardiac orifice of the ftomach, which is very curious.

In the *beaver* there is a large oval mafs of glands on the right fide of the œfophageal orifice of the ftomach. It confifts interiorly of a number of cells, decreafing in fize, and uniting with each other from the furface next the infide of the ftomach. It pours out its liquor into the ftomach through a number of irregularly-fhaped holes. Mr. Home reckons 32 of thefe holes, which he ftates to be arranged upon three ridges, on the furface of the gland next the infide of the ftomach; nine on each fide of a middle ridge, and feven on each of the lateral ridges.

The glandular ftructure of the *beaver's* ftomach has been long known, and was confidered the only inftance of the kind; but a fimilar apparatus was difcovered feveral years ago in the ftomach of the *common dormoufe* by Mr. Macartney. The œfophagus, juft before its entrance into the ftomach, makes a ferpentine turn, and at that place becomes greatly enlarged, and furrounded by a cellular glandular ftructure. The cells produce on the fuperficies of the gland a number of flight elevations, which give it the appearance of a mulberry. The entire fize of the gland is, however, about that of a pea. The œfophagus, before it enters the gland, would fcarcely receive a pin; and after the dilatation in the gland, it again contracts in a degree, where it opens into the ftomach. The openings of the gland into the œfophagus are much fewer and larger in proportion than they are in the *beaver*, fo that nearly the whole of the cellular ftructure can be feen by looking at the interior furface, if the part be diftended or fpread out. This gland approaches more nearly to the bulbus glandulofus of birds, than any fimilar ftructure does in the clafs mammalia. In Mr. Home's account of this gland, he appears to claim the difcovery of the internal ftructure, although preparations and drawings of both the external and internal appearances were annually fhewn by Mr. Macartney at his lectures, for feven years before Mr. Home wrote upon the fubject.

In the *wombat*, there is a glandular mafs that occupies a great part of the fmall curvature of the ftomach, which almoft exactly refembles the glands in the *beaver*. There are many irregular-fhaped openings on the inner furface, within which are fmaller openings or cells. A very fine plate of this ftructure has been publifhed by Mr. Home in the Phil. Tranf. for 1808.

A perfectly fimilar apparatus was found by Cuvier in the pofterior part of the ftomach of the *pangolin* (*manis pentadactyla*). The ftomach of this animal is alfo remarkable on account of the great thicknefs of the coats towards the pylorus, which appears to operate in the fame manner as the gizzards of birds, for the *pangolin* fwallows fmall ftones and gravel.

The *ornithorhynchus hyftrix* is likewife reported to take fand into its ftomach. Thefe extraneous fubftances, in both cafes, are, no doubt, defigned to triturate the food, and fupply the want of teeth in thefe animals.

Cuvier defcribes in the *northern lamantin* (*trichecus borealis*), an oval gland, as large as the human head. It is placed near the cardia, and appears to poffefs exactly the fame ftructure with thofe above-mentioned. The fluid fecreted is a whitifh colour. Cuvier fuppofes, and with every appearance of probability, that the fmall appendix of the firft ftomach in the *fouthern lamantin* correfponds to this gland. The appendix is evidently defigned for fecreting a fluid, and not retaining the food: from the alliance between the two animals, therefore, it can fcarcely be doubted, that the appendix and gland perform fimilar offices.

The ufe of the cardiac glands is commonly fuppofed to be for furnifhing an extraordinary quantity of the gaftric fluid, and Mr. Home endeavours to prove that fimilar glands, upon a fmaller fcale, exift in all ftomachs. There are, however, fome reafons for queftioning this opinion. The ftructure of thefe cardiac glands, and of thofe fmall glandular pores that are generally found in the ftomachs of mammalia, more nearly refembles that of mucous follicles than any other fecretory apparatus. The fluid furnifhed by the glands of the ftomach is in every refpect fimilar to the mucus of the inteftines. The fituation of the cardiac glands, alfo, is not the moft favourable for the application of a digeftive fluid, it being immediately adjoining that portion of the ftomach which receives the food in the firft inftance, and in which it is depofited for fome time, as a refervoir in certain fpecies. The cardiac glands might be fuppofed, perhaps with greater

propriety,

propriety, to be deſigned for the ſecretion of a fluid capable of macerating and preparing the food for digeſtion, inſtead of a really ſolvent or aſſimilating liquor.

Plates II., III., and IV. of the *Anatomy of Mammalia*, are intended to exhibit the ſtructure of the *ſtomach*. *Fig.* 2. *Plate* II. repreſents the ſtomach in the *ferret*, as an example of the form of this organ in the *carnivorous* mammalia. *Fig.* 3, of the ſame plate, is the ſtomach of the *garden ſquirrel* of Pennant (*myoxus nitela*): *a* is the œſophagus; *b*, the inteſtine ariſing cloſe to it; *c*, the globular ſtomach. *Fig.* 4. exhibits the ſtomach of the *ornithorhynchus paradoxus*, which is ſelected on account of the ſingularity of its form: *a*, the œſophagus; *b*, the inteſtine; *c*, the bottle-ſhaped ſtomach; *d*, the biliary duct. *Fig.* 5. repreſents the double ſtomach of the *hamſter*: *a*, the œſophagus; *b*, the cardiac half or portion of the ſtomach, much turned up at the left end; *c*, the pyloric half of the ſtomach, exhibiting three dilated parts; *d*, the duodenum. *Fig.* 6. ſhews the ſtomach of the great *kanguroo*: *a* indicates the œſophagus; *b*, the cardiac portion of the ſtomach, at the left extremity of which are ſeen two proceſſes, *c* and *d*. At the doubling of the pyloric portion *e*, are alſo ſeen two proceſſes like cæca, which are pointed out by the letters *f* and *g*. The pylorus is ſhewn by the letter *h*. *Fig.* 7. repreſents the ſhape of the digeſtive organ in the *vampyre bat*: *a* is the œſophagus; *b*, the dilated part, by which that tube communicates with the ſtomach; *c*, the cardiac end of the ſtomach; *d*, *d*, the two convolutions of the pyloric portion of the ſtomach; *e*, the duodenum. *Fig.* 8. exhibits the external form of the ſtomach in the *two-toed ſloth*: *a* is the œſophagus; *b*, *b*, *b*, indicate the elevations upon the ſurface of the cardiac or firſt diviſion of the ſtomach, that are produced by the three cavities into which it is ſeparated internally; *c*, the pyloric portion of the ſtomach. *Fig.* 1. *Plate* III. of the *Anatomy of Mammalia*, repreſents a view of the firſt ſtomach or paunch of the *camel*, laid open on the anterior part to expoſe its internal ſtructure and communication with the ſecond ſtomach: *a* is the œſophagus; *b b*, the longitudinal ridge, dividing the cavity into two compartments; *c c*, the muſcle which paſſes to the third ſtomach; *d*, the opening into the ſecond ſtomach; *e e*, the muſcular cells on the right ſide of the cavity; *f f*, the larger cells on the left ſide, the water of which ſerves to moiſten the food lying over them, and to make it of a fit conſiſtence to be regurgitated into the mouth, along the canal formed by the longitudinal ridge, and the muſcle going to the third ſtomach; *g g*, a broad muſcular band ſeparating the cellular ſtructure into two portions. *Fig.* 2, of the ſame plate, exhibits a poſterior view of the four ſtomachs of the *camel*, in which the firſt is unopened, but the ſucceeding three are cut open, and preſerved in three relative ſituations to the firſt ſtomach: *a* is the œſophagus; *b b*, point out the poſterior ſurfaces of the firſt ſtomach in a diſtended ſtate; *c* ſhews the communication between the firſt and ſecond ſtomachs; *d d*, the muſcle running along its upper part to terminate in the orifice of the third ſtomach. This muſcle, when it acts with its greateſt force, brings forward the orifice of the third ſtomach nearly cloſe to that of the ſecond, and by ſo doing, ſhuts up the rows of cells in the lower part of the cavity, ſo that no part of the ſolid food can paſs into them; *e*, *e*, the rows of cells which form a reſervoir for the water; *f*, the opening leading into the third ſtomach; *g*, the cavity of that ſtomach; *h*, the orifice of the fourth ſtomach; *i i*, the longitudinal plicæ of the fourth ſtomach; *k k*, the rugous ſtructure at the lower part of the ſame cavity; *l*, the glandular projections oppoſed to the orifice of the pylorus; *m*, the pylorus; *n*, the dilatation or membranous cavity between the pylorus and duodenum; *o*, the duodenum.

Fig. 3. *Plate* III. of the *Anatomy of Mammalia*, is deſigned to ſhew the directions of the muſcular fibres, which run upon the orifices and ſides of the cells in the firſt and ſecond ſtomachs of the *camel*. The cells of the left ſide of the firſt ſtomach are employed as examples, on account of their being the largeſt, and their muſcles the moſt diſtinct, but the ſame ſtructure exiſts in the cells of the ſecond ſtomach alſo: *a a*, the longitudinal ridge, to ſhew its muſcular ſtructure, and the mode in which the fibres go off, to furniſh the orifices of the cells; *b b b b* point out the courſe of the fibres going from cell to cell to cloſe their orifices; *c*, *c*, the muſcular fibres, by means of which the cells throw out their contents. In *Plate* IV. of the *Anatomy of Mammalia*, *fig.* 1. is a view of the internal ſurface of the ſtomach in the *rat*: *a* is the portion of the ſtomach over which the cuticle of the œſophagus is continued. This cuticular coat terminates in an eminent puckered border; *b*, the pyloric portion of the ſtomach. This figure is of the natural ſize.

Fig. 2. of the ſame plate, exhibits the external appearance of the ſtomach of the *dormouſe* of the natural ſize, ſeen poſteriorly: *a*, the œſophagus; *b*, the gland, ſeen full, on account of the curvature which the œſophagus makes before it enters the ſtomach. *Fig.* 3. is a view of the cellular ſtructure of the gland, which is expoſed by ſlitting the part open: a portion of the ſtomach is left with the gland. *Fig.* 4. ſhews the ſtomach of the *wombat*, leſs than the natural ſize, and inverted, to expoſe the internal appearance and foramina of the cardiac gland. The inner ſurface of the ſtomach diſplays ſome reticulated lines at the great end, from which longitudinal lines are extended towards the pyloric portion of the ſtomach: *a*, the œſophagus, covered with cuticle; *b*, the gland. *Fig.* 5, of the ſame plate, ſhews the ſtomach of the *porpoiſe*, of courſe much leſs than natural: *a* is the œſophagus; *b*, the firſt ſtomach or reſervoir of the food; *c* is the ſecond ſtomach; *d* is a portion of it, diſtinguiſhed on this ſide by a fiſſure, which ſome have conſidered as ſeparating it into a third ſtomach; *e* is the inteſtine-ſhaped ſtomach, which we are diſpoſed to admit as the beginning of the duodenum; *f* is the laſt ſtomach, or, as we ſuppoſe, the dilated part of the duodenum for receiving the pancreatic and biliary fluids; *g* is the inteſtinal canal.

Inteſtines.—It may be ſtated as a general obſervation, from which there are ſcarcely any exceptions, that the capacity of the alimentary canal is in proportion to the difficulty of aſſimilating the kind of food uſed by the animal. It is, therefore, greateſt of all in thoſe animals that live upon raw, fibrous, or woody vegetables; leſs in thoſe that conſume ſucculent or cooked vegetables; leſs ſtill in thoſe that eat animal food occaſionally; and leaſt of all in thoſe that ſubſiſt excluſively upon fleſh, fowl, and eggs.

It ſhould, however, be remembered, that the length of the inteſtinal canal by no means determines the extent of the digeſtive apparatus. The length ſhould always be calculated in reference to the width in general of the inteſtines; the dilatation of particular parts, and the extenſion of their internal ſurfaces by folds or valves. The complication of the ſtomach, and the perfection of the organs of maſtication, ſhould alſo be conſidered as influencing any concluſion to be drawn from the length of the inteſtinal canal.

In the truly *carnivorous mammalia*, the whole tract of the inteſtines uſually exceeds the length of the body, only in the ratio of three, four, or five to one. In the *great bat* (*veſpertilio noctula*,) the inteſtines are but twice the length of the animal. The proportion of the circumference to the length of the inteſtine, in this ſpecies of *bat*, is as one to twenty-eight. In the *hyæna*, the inteſtinal canal is eight times longer than the body, but then the proportion of the cir-

 circumference

cumference to the length of the ſmall inteſtine, is as one to one hundred and ten; that of the cæcum as four to nine; and that of the colon and rectum, taken together, as one to ſix.

In the *human ſubject*, the length of the inteſtines is ſix or ſeven times that of the body.

In the *monkey tribe*, this proportion varies from five to eight.

In the *lemur genus*, with the exception of the *loris*, the inteſtines vary from four to ſix times the length of the body. The *lemurs*, it ſhould be obſerved, have a larger cæcum than the *monkey* kind. The *loris* have ſtill ſhorter inteſtines in proportion to their body; but the latter is very long.

Amongſt the *cheiropterous mammalia*, the *vampyre bat* has the inteſtine about ſeven lengths of its body. It has a complicated ſtomach and no cæcum.

In the greateſt number of the *plantigrade* quadrupeds, the inteſtines have a conſiderable length. This is counteracted by the ſmallneſs of the canal, and the want of a cæcum. The *ſhrews* have the inteſtines ſhort, and in other reſpects like the *carnivorous digitigrade* mammalia.

In the *herbivorous ſaltigrade*, the length of the alimentary canal is conſiderable, beſides the addition of cæca, but in the *rat* genus, which live on a mixed food, the length of the inteſtines does not exceed that of the *monkies*.

The inteſtines are ſhort in the *edentata*, and very much ſo in the *tardigrada*, which ſeems hard to explain, as they want the cæcum, and live, nevertheleſs, upon vegetable matters. Cuvier ſuppoſes that the gaſtric juice may be particularly active in the *tardigrade* animals.

The *echidna* has the inteſtines ſeven times its own length. In the *armadillos* they are only five lengths of the body.

In the *elephant*, the inteſtinal canal is only ſeven times as long as the body, but it is very wide. In the *hippopotamus* it is nine times as long as the body. In the *daman* it is about the ſame.

The *ruminating* quadrupeds have the longeſt inteſtinal canal of all. In the *ram* it is twenty-ſeven lengths of the body.

The *ſolipeda* have the inteſtines about eight to ten times as long as the body, but the want of extent is amply made up by the prodigious volume of the cæcum and colon.

The *ſeal*, although ſupported by animal food, has the inteſtinal canal eighteen times as long as its body, the diameter, however, is ſmall, and its ſtomach is very ſimple, and its teeth incapable of minutely dividing its food,

The *ſouthern lamantin* (*trichecus auſtralis*) has the inteſtines only about ſix lengths of its body, although it lives upon vegetables; but it has a complicated ſtomach furniſhed with a large gland.

The *cetacea* have a long alimentary canal, but it is very narrow, and wants the cæcum. In the *grampus* we found the large blood-veſſels, as the vena cava and portæ, and the aorta, to be nearly the ſame width of the inteſtine.

It is curious to obſerve the occaſional difference between the length of the inteſtines in the wild and tame ſpecies of the ſame genus. Thus, in the *wild boar*, the body bears the proportion to the inteſtines of 1 to 9; in the *hog*, of 1 to 13.5; in the *wild cat*, it is as 1 to 3; and in the *domeſtic cat*, as 1 to 5. This proportion is different in the *wild* and *tame rabbits*; the former has it as 1 to 11.4, the latter as 1 to 9.3.

Cuvier has given a very full table of the proportionate lengths of the different parts of the alimentary canal, and alſo of their circumference, in the third volume of the "Anatomie comparée," to which we ſhall refer the reader.

The length of the whole inteſtinal canal, in relation to that of the animal, is greater in mammalia than in the other claſſes of animals. This unqueſtionably becomes neceſſary from the food undergoing a more tedious proceſs of aſſimilation, but it likewiſe depends in a degree on the more elongated form of the body. This obſervation particularly applies to *fiſhes*, in whom the tail becomes incorporated with the general figure of the animal. To calculate the relation of the inteſtinal canal to the body, the capacity of the one, in all directions, ſhould be compared with the entire bulk of the other. The length and the width alſo of the great inteſtines are greater in proportion to the ſmall inteſtines of mammalia than in any other claſs. It is in theſe animals that the terms of great and ſmall inteſtines are only indeed appropriate.

The great and ſmall inteſtines are nearly of the ſame length in the *ſaltigrade* quadrupeds; ſometimes the former are even longer: for inſtance, in the *paca*, the length of the ſmall inteſtines is to that of the great, as 1 to 1.3, and in the *water-rat*, as 1 to 1.2. In the *hamſter* and *field rat*, it is, however, in the proportion of 2 to 1, and in the *Norway rat* and *common mouſe* the ſmall inteſtines are four times the length of the great.

In the *hoofed* quadrupeds there is not a great difference between the length of the two diviſions of the inteſtine in general. What there is, however, is in favour of the ſmall inteſtines, but it ſhould be recollected that the great inteſtines are commonly wide in theſe tribes of quadrupeds.

In the *omnivorous* quadrupeds, the ſmall inteſtines exceed the great in length ſomewhat more, although the great are not ſo much dilated as in the *large herbivorous* ſpecies.

But it is in the *carnivorous* tribes that the ſmall inteſtines are very materially longer than the great. Thus, in the *lion* and *jaguara*, they bear the proportion of 6 to 1; in the *dog* and *wolf*, 5 to 1; in the *hyæna*, 6.2 to 1, &c. In ſome *monkies*, and in the *human ſubject*, they are alſo about 5 to 1, but this is in a degree counteracted by the width of the great inteſtines.

We ſhall now proceed to the deſcription of the forms and ſtructure of the inteſtines in mammalia, which it will be neceſſary to treat a little in detail.

The inteſtinal canal of the *monkey* kind approaches in general ſtructure that of the human ſubject. In the *ourang-outang*, there are both a cæcum and an appendix vermiformis, as in *man*; but in the other ſpecies of *monkey* the latter is wanting. The cæcum of the *ourang-outang*, according to the repreſentation given of it in Tyſon's Anatomy of the *pigmy*, does not project much out of the line of the inteſtine; but in the other ſpecies of *ſimia*, the cæcum forms more of a cul-de-ſac than in man, except the *gibbon* or *long-armed ape*. The Pariſian diſſectors deſcribe the cæcum of the *ſapajous*, or the ſubgenus *callitrix*, as being two inches and a half long and one inch wide at the origin, after which it becomes ſmaller, and ends in a pointed manner. They likewiſe deſcribe ſome valves on the inſide of the colon of the *ſapajous*, ſimilar to thoſe found in the colon of the *oſtrich*.

The *lemurs* have the cæcum more elongated than the *monkies*. In the *lemur macaco*, the colon is much wider in the beginning than the ſmall inteſtines, but afterwards becomes rather leſs. The cæcum is wider than the latter at its origin, but becomes gradually ſmaller at the end. It is a conſiderable length, and forms many ſpiral convolutions, and has a good deal the appearance of a coiled worm. In the *tardigrade* and *ſlender lemurs*, the parietes of the inteſtinal canal are thin, and dilated at intervals into ſacs; the cæcum is long and but little dilated. The *lemur tarſius* of Pallas has the great and ſmall inteſtines about an equal width,

width, except the cæcum, which is long and prodigiouſly dilated.

In the *galeopithecus*, the firſt portion of the colon and the cæcum have three longitudinal bands, which throw them into numerous and regular facs. This facculated part of the gut is very wide compared with the reſt. The ſmall inteſtine opens into it at a right angle, about half way between the extremity of the cæcum and the termination of the dilated and facculated part of the colon, which is continuous with the cæcum.

The *bats* have the great and ſmall inteſtines nearly of the ſame width, and the internal coat has no tranſverſe folds or valvulæ conniventes. It has merely villi on the ſurface, which decline as uſual in the great inteſtines. They have no cæcum, but ſometimes a ſlight projection at the origin of the colon. The *vampyre bat* has the firſt part of the canal wider than the reſt, and with very thin coats. It is more contracted and has thicker coats in the rectum, in which there are alſo ſome longitudinal folds internally.

The *carnivorous plantigrade* quadrupeds, except the *ichneumons*, have the inteſtinal canal nearly of the ſame width throughout. In general the coats of the rectum are thicker than in the other parts, and there are ſome longitudinal folds in it. There is no cæcum, but at the part correſponding to it there is a row of mucous glands upon one ſide of the inteſtine. The internal coat of the canal is more or leſs villous in the different genera. In the *mole*, for inſtance, the villi are ſhort; in the *hedge-hog* they are long in the ſmall inteſtines. The *ichneumons* have a ſmall proceſs at the origin of the colon, which Cuvier terms a cæcum, but which ought rather, perhaps, to be called an appendix vermiformis. In the figure he has given of this part in the Egyptian *ichneumons*, it appears a good deal leſs than the ſmall inteſtine, which is itſelf not half the diameter of the colon. Hedwig deſcribes the inteſtines of the *bear* as having long and handſome villi.

Amongſt the *digitigrade carnivorous* quadrupeds, the genus *muſtela* is diſtinguiſhed by the want of a cæcum. The *otter* has a ſlight dilatation at the place where the cæcum might be. The inner membrane is finely villous in the ſmall inteſtine. This appearance diminiſhes towards the part of the canal correſponding to the great inteſtine, and is again to be found near the anus. The row or ſtripe of mucous glands, which is uſually obſerved to cover a conſiderable extent of the ſide of the canal at the origin of the colon, is very ſtriking in this genus.

The other *digitigrade carnivora* have always more or leſs of cul-de-fac at the origin of the colon. Their great inteſtines are however ſhort, and without any facs or dilatations by which the progreſs of the food is retarded through them. There are, likewiſe, no valvulæ conniventes in the ſmall inteſtines, but the inner coat has fine villi. The genus *viverra* has a ſhort ſlender cæcum, ſimilar to that of the *ichneumon*. The ſmall inteſtine has an oblique or a valvular opening, and the inner coat exhibits at that place ſome marked longitudinal folds.

In the genus *felis*, the ſmall inteſtines have a much leſs diameter than the others. The villi are very evident, in ſome ſpecies particularly. In the *lion* the villi are long and floating. The cæcum in this genus is ſhort, and terminates in an obtuſe cone, of which the coats are thick, and contain many mucous glands. There are ſome longitudinal rugæ towards the end of the colon, and in the rectum.

In the *dog* kind, the villi of the ſmall inteſtines are long. The cæcum forms ſome curves, which adhere to each other, and to the ſide of the ſmall inteſtine, by means of the cellular ſubſtance, which renders the paſſage of any ſubſtances through it more difficult. There are ſome longitudinal folds in the great inteſtines, as in the *cats*. The whole canal is nearly of the ſame width.

The coats of the inteſtinal canal are thin in the *hyæna*. Their diameter continues to increaſe from the pylorus to the cæcum. The latter is long and narrow, and has a rounded termination.

In the *pedimanous* or *marſupial* animals, there is ſome variety in the inteſtinal canal. The *Virginian opoſſum* has the ſmall inteſtine a third leſs than the great: they have fine villi interiorly: there are no rugæ or valvulæ. The cæcum is not long, and appears to be a prolongation of the colon. In the *marmoſe* or *murine opoſſum*, the ſmall and great inteſtines are about the ſame diameter: they have ſome contractions. In the *cayopollin*, or *Mexican opoſſum*, the duodenum is wider than the reſt of the ſmall inteſtines. The cæcum is long, ſtraight, and twiſted in a ſpiral manner. The colon is larger at the origin than elſewhere. The *brown phalanger* (*didelphis orientalis*) has the ſmall inteſtines one-third leſs in diameter than the great. The cæcum is very long, wide, and formed into numerous ſacculi along the ſides, and terminates in a ſmall canal, which Cuvier conſiders a ſpecies of appendix vermiformis.

In the *kanguroo rat*, the coats of the inteſtines are thin. The ſmall guts have the internal membrane without villi, but it is thrown into very fine folds, which form zig-zags tranſverſely: the cæcum is ſhort, wide, and round. The colon is very large at its origin.

In the large *kanguroo* the inteſtinal canal differs very much from that of the preceding ſpecies. The diameters of the ſmall inteſtines diminiſh gradually from the duodenum to the ileum. Their inner ſurface is without rugæ, but is villous. The cæcum is capacious, very long, and is facculated by two longitudinal bands, which alſo extend for ſome way upon the colon, producing the ſame effect upon it. The great inteſtine afterwards becomes narrow. The facculated portion of the colon has irregular folds internally, and there are ſome ſlight longitudinal rugæ in the remainder of the great gut. The inteſtines of the *kanguroo* reſemble thoſe of the *ſaltigrade* quadrupeds, in which tribe we have placed it in our claſſification.

In the *phaſcolomys*, or *marſupial rat* of New Holland, which alſo ſhould be claſſed with the *ſaltigrade* quadrupeds, the whole tract of the inteſtines, even the cæcum, is nearly of the ſame width. The cæcum is ſhort, round, and ſmooth: there is an appendix vermiformis which goes off at the angle formed by the ſmall inteſtine with the cæcum. It has a ſmall orifice guarded by a valve. The *phaſcolomys* and the *ourang-outangs* are the only inſtances in mammalia which have both a cæcum and vermiform appendix: in this circumſtance they reſemble the human ſubject.

The *porcupine* has the duodenum very wide, ſomewhat reſembling an additional ſtomach. The remainder of the ſmall inteſtines is narrow. The villi of the mucous membrane have the figure of thin conical ſcales, as in the human inteſtine, but more narrow and prominent. The cæcum is large, divided into facs by three muſcular bands. At the origin of this inteſtine, there is one of thoſe facs much larger than the reſt, projecting out of the line formed by the colon with the cæcum. This gut altogether has a good deal the figure of a ſcythe. The colon has ſome cells of a ſmaller ſize than thoſe of the cæcum.

In the *guinea-pig* the cæcum is very capacious, and is in a degree coiled when it gives origin to the colon, which is almoſt as wide as the cæcum for a little way, but afterwards gradually contracts to the dimenſions of the ſmall inteſtine.

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The *paca* and *agouti* refemble the *guinea-pig*. The opening from the cæcum in thefe animals is contracted by a valve. The colon of the *agouti* forms behind the liver many little concentric convolutions before it terminates in the rectum. The glands at the origin of the colon are very remarkable in the *paca*, forming a thick mafs.

In the *rabbit* and *hare* the fmall inteftines are uniform in their fize. They are villous, and have fome longitudinal folds internally in the ileum. The cæcum is very extenfive. It has a conical figure, and exhibits regular contractions upon the furface, which correfpond to a fpiral fold that interrupts the cavity internally, like the fpiral valve in the cæca of the *oftrich*. The colon is as wide as the cæcum at its origin, but it very foon contracts: it is facculated at firft by three longitudinal bands, and afterwards by only one. The internal coat is fmooth in the cæcum, papillated in the firft portion of the colon, and longitudinally rugous in the rectum.

The *fquirrel* has a long cylindric cæcum with fmooth parietes. The *flying fquirrel* has a fimilar inteftinal canal, but the cæcum ends in a pointed manner.

The *beaver* has a fhort dilatation at the origin of the duodenum. The cæcum is of great fize, elongated, and conic. The colon alfo is very wide at its origin. There are numerous contractions and dilatations throughout the great guts.

The *Polifh marmot* has the fmall inteftines ftraight. The cæcum is very voluminous, and divided externally by contractions, and internally by a correfponding number of annular folds. The colon is large at the beginning. The inteftines of the *marmot* of the Alps are fimilar to the preceding.

In the *ondatra*, or *mufk rat*, the cæcum is of a prodigious extent: it paffes from the umbilical region to the left iliac; then into the right iliac, extending as far as the hypochondriac region of that fide. The colon at its commencement is convoluted in a fpiral manner.

The greateft part of the inteftinal canal of the *water-rat* has a fmall diameter. The cæcum is long and wide, with contractions. The colon is very wide at its origin; it diminifhes afterwards, and is twifted in a clofe fpiral manner for a great part of its length. The twifted part of the colon is diftinguifhed by regular folds, which are vifible from the outfide of the gut. The coats of the whole inteftinal canal are thin and tranfparent in this animal.

The inteftinal canal in the *campagnol* (*mus arvalis*) refembles that of the *water-rat*.

The cæcum is wide, fhort, a little curved, and without contractions, in the *black* and *Norway rats*; longer and narrower in the *common moufe*; elongated alfo, tapering at its extremity, and divided by contractions in the *field rat*. In the *Norway* and *black rat* the colon is at firft ftraight, has thick coats, and fome longitudinal folds interiorly; after which it is dilated, and exhibits, for fome way, fimilar fpiral traces to thofe of the *water-rat*: it then contracts again, and has but a fmall diameter in the greateft part of its extent towards the anus.

In the *moufe* and *field rat* the colon is wide at the commencement, but afterwards it becomes much contracted. There are oblique or fpiral ftriæ, formed by the folds of the internal membrane.

The *hamfter* has the fmall and great inteftines of the fame diameter, except where the cæcum is formed. Both the ileum and colon open into a dilated part, which produces at one fide feveral fpiral turns, and at the other the cæcum. This laft is of confiderable fize, and divided into a number of facs by means of one band or cord, which runs along the concave fide of this gut.

In the *mole rats* the cæcum is long and wide, and the colon fpirally twifted. The *jerboa* has the cæcum formed into three fpiral turns.

Amongft the *edentata* there is a good deal of variety to be obferved.

In the *three-toed ant-eater* the fmall inteftines are very much puckered by the mefentery, by which the canal is irregularly contracted and dilated, like the great inteftines of many animals. The large inteftines of this animal form a fhort, wide, fmooth canal; and on each fide of the termination of the ileum in this great gut, there is a little procefs or appendix, with a contracted neck and bulbous head. Thefe appendices correfpond in fituation to the cæca of birds, with which clafs of animals the toothlefs quadrupeds are allied in many parts of their ftructure and economy. The cæca of the *ant-eaters* are too fmall to ferve as refervoirs for their food: they communicate with the great inteftine by a fmall orifice, as does alfo the ileum.

In the *echidna* the fmall inteftines are about half the width of the great: they have villi, but no valves upon the interior furface. The mucous glands are numerous, and particularly plain from being of a black colour. The cæcum is fingle: it is a fhort, ftraight, blunt procefs.

In the *ornithorhynchus* the duodenum is wider than the reft of the inteftinal canal, which gradually diminifhes to the cæcum. This part is a long narrow procefs or appendix. The great inteftines grow wider the nearer they approach the anus. The internal membrane in the fmall inteftines is formed into numerous prominent laminæ, fomewhat like thofe of fifhes; and in the beginning of the great inteftines it produces fome longitudinal folds.

The *long-tailed manis* has no cæcum: the commencement of the colon is diftinguifhed by an increafe in the width of the inteftine, and the thicknefs of its coats. There is no cæcum likewife in the *pangolin*, or *fhort-tailed manis*.

There is no cæcum in the *armadillos*, but the great inteftine is thicker and wider than the reft of the canal, from which it is feparated by a contraction: the fmall inteftines are much puckered and folded by the manner in which the mefentery is attached to them.

The *tardigrade* quadrupeds have the fmall inteftine gathered into irregular dilatations by the mefentery. There is no cæcum. The great inteftine is diftinguifhed from the fmall by a fudden dilatation, and a valve interiorly at the part where the colon commences. The irregular form and contractions of the fmall inteftines, in fome of thofe animals which have the colon fhort, and want the cæcum, are defigned apparently to anfwer the fame purpofes that a capacity in the great inteftines does in other animals.

The *Cape ant-eater* has a fhort oval cæcum.

The *hoofed* quadrupeds are remarkable for the capacity of their great inteftines. Amongft the *multungulata*, the *elephant* has the colon fo large as to cover a great part of the abdominal vifcera: it is folded from fide to fide, and lies in the front of the other inteftines: it is facculated in two rows on each fide. The cæcum is alfo very large, and thrown into facs or cells by three mufcular bands. The fmall inteftines have an uniform diameter. The ileum terminates by a circular valvular opening in the colon. The internal membrane of both the fmall inteftines and the colon is plicated tranfverfely: in fome places it projects fo as to form valves: in the rectum the folds are longitudinal. The furface of the internal membrane in the fmall inteftines is covered with fine fhort papillæ. The coats, more particularly the mufcular one, are very thick.

In the *one-horned rhinoceros* the cæcum is very wide, and divided into facs, as is the colon ftill more plainly, at leaft at one part; but the moft curious part of the ftructure of the inteftinal canal in this animal is to be obferved in the inner coat. In the firft portion of that part of the canal between the pylorus and the infertions of the hepatic and pancreatic ducts, the mucous membrane forms little projecting longitudinal folds, in the form of fegments of a circle: in the next portion of the fame part of the gut, thefe folds become more tranfverfe in their direction, and affume a triangular figure. A little beyond the infertion of the biliary ducts the laminæ become more numerous, compreffed, and irregularly lobed. Farther on there is upon the internal coat a kind of papillæ, lengthened into filaments, preffed the one againft the other, efpecially about the middle of the length of the fmall inteftine. The extremities of fome of thefe proceffes are bifid. The internal furface of the cæcum has only the rugæ that correfpond to the facs. The laminated ftructure is renewed in the colon; the folds are tranfverfe, and grow larger as they come nearer to the rectum, between which gut and the colon the laft lamina forms a valve.

The *Cape cavy* has very fingularly formed cæcum and colon: the firft of thefe is a large irregularly fhaped bag, which is puckered upon the fides by two longitudinal bands The ileum opens into it by a projecting contracted orifice, and near the fame place the colon arifes: there is a valvular fold at the aperture of the colon. This inteftine is at firft fuddenly and greatly dilated: the inner coat of this portion is fmooth, and irregularly plaited, as in the cæcum. The part of the canal fucceeding the dilatation is fmall, has thick parietes, and the inner coat with waving folds, which are at firft longitudinal, but afterwards become tranfverfe in their direction. Beyond this portion the colon grows wider, and then becomes irregular in its fhape and diameter: it has broad longitudinal folds internally. There next fucceeds another enlargement of the colon, from the fides of which arife two pyramidal or cone-fhaped proceffes, which pafs in the direction contrary to that of the reft of the gut, in the fame manner as the cæca of birds, to which they bear a confiderable refemblance. The colon, after furnifhing thefe two appendices, makes feveral fpiral turns upon itfelf, and fome convolutions in the belly, and terminates in the rectum. This laft inteftine has thicker coats than the colon, and has broad longitudinal folds internally.

Amongft the *bifulca*, the *ox* has no folds in the interior of the fmall guts, except in the duodenum, where there are fome tranfverfe rugæ or plaits. The villi have the figure of fine fcales, according to Cuvier; but we may obferve, this ftructure is by no means uncommon in mammalia. The cæcum is not large: it is firft contracted, then dilated, and terminates in a bulb. The inner coat is without rugæ, except where it is narrow, and there we find fome longitudinal rugæ: the colon is without folds of the inner coat: the rectum has thicker coats; and the internal furface furnifhes longitudinal folds, and, very near the anus, fome circular ones. The *goat* has a much larger cæcum in proportion than the *ox*.

The duodenum of the *lama* is wide at the commencement, forming an oval fac; the other fmall inteftines are puckered by the mefentery. The cæcum has a conical fhape, and no contractions: the internal membrane of the fmall inteftines has fome tranfverfe folds; that of the colon longitudinal ones. In other refpects the inteftinal canal of the *lama* refembles that of the *ox*, as does alfo the alimentary canal of the other *ruminants without horns*.

The great inteftines are much more capacious in the *horfe*, *afs*, &c. than in the *ruminating* quadrupeds; more particularly the cæcum, which is of a prodigious fize. This gut is nearly as wide as it is long; and when the excrementitious parts of the food are allowed to accumulate in it and the colon, the abdomen has that tumid appearance which is feen in *affes* and in *horfes*, that are fed only upon hay or ftraw. The colon begins with a dilatation, not much inferior in fize to the cæcum: it is doubled upon itfelf, and in its courfe through the abdomen it forms other curves or arches. The great inteftines are drawn up into facs: thefe are larger in the firft portions of the colon. For a more detailed account of the inteftines of the *horfe*, we fhall refer the reader to the anatomy of that animal in this dictionary.

It is faid, that in the *morfe* (*trichecus rofmarus*) the cæcum is fituated in the left fide of the abdomen. There is no other inftance of the kind in mammalia, except in cafes of tranfpofition of the vifcera. The cæcum in this animal is very inconfiderable, refembling a mere knob of the inteftine. Both the fmall and great inteftines have very nearly the fame diameter.

In the *fouthern lamantin* the cæcum has a very peculiar figure: it forms the fegment of the outfide of a circle, or has a crefcentic appearance. The ileum communicates with the middle, from which alfo the colon arifes. This inteftine is wider at firft than the cæcum, and forms fome clofe convolutions; it afterwards proceeds as a flightly twifted canal, and becomes again enlarged near the rectum, which laft gut is wider than the colon.

The *cetacea* are ftated by Cuvier to want the cæcum; Hunter, however, afferts that it exifts in the *piked* and *large whale-bone whales*. In the genus *delphinus* there is certainly no dilatation correfponding to the cæcum: the laft inteftines are diftinguifhed by their having a fmaller diameter, and thicker mufcular coats. In the *porpoife* the internal membrane forms fome longitudinal folds, which are not very eminent in the fmall inteftines, and decline in the colon and the rectum. The *grampus* has tranfverfe and longitudinal folds, which produce in fome degree the appearance of mefhes: thefe are moft plain in the duodenum, and gradually diminifh until they difappear. For about ten inches above the anus, the inteftine is lined with a thick white cuticle. All the *cetacea*, we believe, have the termination of the rectum covered with cuticle, and contracted in fize. In the *piked whale* the inner coat of the duodenum has longitudinal rugæ, at a diftance from each other, which receive lateral folds: thefe decline in the other inteftines, and appear to correfpond with the mefhes of the *grampus*. The duodenum in the *bottle-nofe whale* fwells into a large cavity, which might be called an additional ftomach, if it were not that the hepatic ducts terminated in it. The whole of the inteftinal canal in this fpecies nearly has the inner coat forming facs or cells, which are again fubdivided into fmaller cells. Thefe open, or have their mouths directed towards the anus, or in the courfe of the food through the canal.

The *cetacea*, as alfo all other animals that inhabit exclufively the water, never have any flatus in their inteftines. The *fpermaceti whale*, however, produces a curious excrement, which is called *ambergris*. This fubftance is fometimes found floating on the furface of the feas that are frequented by thefe *whales*, and at others is taken from their great inteftines. When *whales* are in a healthy ftate, their excrements are liquid, and of a black colour; but when fickly, the fæces are folid, and accumulate in fuch quantity in the inteftines as to produce a tumour of the abdomen. It is in thefe cafes that the ambergris is obtained from the *whales* themſelves: it is found in the great inteſtines, about from two to ſix or ſeven feet from the anus. When taken out, it has the ſame ſmell and the black colour of the fluid fæces; but after expoſure to the air, it becomes harder, whiter, and acquires its peculiar odour. The pieces of ambergris are of various ſizes, from half an ounce weight to 100 lbs. or more. Dr Swediar relates that one piece weighed 182 lbs., and another 130 lbs., which was worth 500*l*. The ambergris is found largeſt and pureſt in the *male whales*. Mr. Hornby found that human fæces, by being long digeſted, acquired ſo ſtrong a ſmell of ambergris, that the veſſel was obliged to be removed out of the laboratory.

Plate V. of the *Anatomy of Mammalia*, repreſents the moſt remarkable varieties in the form of the inteſtines. *Fig.* 1. is the cæcum and appendix vermiformis of the *ourang-outang: a* is the ileum; *b*, the cul-de-ſac, which takes the place of cæcum; *c*, the colon; *d*, the appendix vermiformis. *Fig.* 2. ſhews the ſame parts in the *phaſcolomys*. The appendix is ſeen to communicate with the gut by a valvular opening. *Fig.* 3. is the origin of the great inteſtines in the *lemur macaco: a* is the ſmall inteſtine; *b*, the colon; *c* is the long convoluted vermiform proceſs, correſponding to the cæcum. *Fig.* 4. is taken from the *ornithorhynchus paradoxus: a*, the ſmall inteſtine; *b*, the colon; *c*, the ſtraight appendix, which has been conſidered analogous to the vermiform. Upon the ſame ſide of the gut a number of black ſpecks are viſible, which are produced by the mucous glands, they appearing of a dark colour in this animal. *Fig.* 5. exhibits the cæcum and parts adjacent in the rabbit: *a*, the ſmall inteſtine; *b*, the cæcum: *c*, the colon. The figure being drawn from a dried preparation, the courſe of the ſpiral membrane is ſeen through the coats of the great inteſtines. *Fig.* 6. repreſents ſome coils of the ſmall inteſtine, and the commencement of the great inteſtine, with a portion of the latter in the *three-toed ant-eater: a*, the ſmall inteſtine, very irregularly formed; *b*, the great inteſtine; *c*, *c*, the two curious cæca peculiar to this animal. *Fig.* 7. is intended to ſhew the cæcum in the *Cape cavy: a* is the ileum; *b*, the ſac, correſponding to cæcum from which the colon ariſes; *c*, the colon doubled upon itſelf at its origin. *Fig.* 8. repreſents the two additional proceſſes which are produced by the great inteſtine of this animal: *a*, *a*, are ſome of the ſpiral turns of the colon at this place; *b*, *b*, the two ſharp proceſſes, reſembling the cæca of birds; *c*, the continuation of the gut, after it has furniſhed theſe two cæca.

Liver.—This viſcus is, in proportion, rather leſs bulky generally in mammalia than it is in man. It is uſually divided more deeply into lobes, and theſe are alſo, in many ſpecies, more numerous. The diviſion of the liver into ſeveral, almoſt diſtinct lobes, has been chiefly obſerved in the beaſts of prey, and an opinion has been entertained by ſome, which was firſt advanced, we believe, by Monroe, that it was neceſſary, on account of the ſudden and extenſive flexions of the ſpine in theſe animals when running. Cuvier has inſerted the number of lobes that are found in a great many ſpecies, from which we have compoſed the following table.

Animals.	No. of Lobes in the Liver.
Ourang-outang	Two large and one ſmall, as in man.
Simia paniſcus	Five.
S. pates	Three.
S. ſabæa	Three.
Simia cynomolgus	Four large and one ſmall.
Howling monkey	Four.
Lemur macaco	Two large and one ſmall.
L. mongooz	The ſame.
L. tardigradus	Four unequal ſize.
L. tarſius	Three large and one ſmall.
L. catta	Two large and one ſmall.
Galeopithecus variegatus	Two, the left is again ſubdivided into five lobes.
Vampyre bat	Four large and one ſmall.
The other bats	Three.
Brown bear, *Racoon*, *Coati*, *Hedge-hog*	Five.
Badger	Four.
Mole	Three.
Water ſhrew, *Otter*, *Weazels*	Five.
Cat genus	Five to ſeven generally.
Jaguar	Four.
Lynx	Eight.
Dog kind	Five, ſometimes ſix.
Muſk animal (*viverra zibetha*)	Four.
Viverra genetta	Five.
Opoſſums	Three to four.
Porcupine	Four large and three ſmall.
Ditto of Hudſon's Bay	Four large and two ſmall.
Hare	Three large and two ſmall.
Pika, *Lepus tolaï* of Pallas	Five.
Lepus ogotona	Seven.
Beaver	Four.
Paca, *Agouti*	Three large and one ſmall.
Cavy	Four.
Guinea-pig	Two large and one ſmall.
Common ſquirrel	Five.
Palm ſquirrel	Three.
Flying ſquirrels	Five
Bobac	Three.
Marmot	Five.
Water rat, *Short-tailed rat* (*M. arvalis*), *Hamſter*, *Black* and *Norway rats*, *Mouſe*, *Sand rat*	Six.
Lemming, or *Lapland marmot*, *Mus lagurus*	Four great and one little.
Mus agrarius	Three.
M. œconomus	Seven.
Dormouſe	Five.
Ondatra, or *muſk rat*	Four.
Kanguroo	Five large and one ſmall.
Phaſcolomys	Four.
Ant-eaters	Three.
Ornithorhynchus	Three large and two ſmall.
Echidna	Four.
Armadillo, *Oryčteropus*	Three.
Hog, *Pecari*	Four.

Elephant

Animals.	No. of Lobes in the Liver.
Elephant *Rhinoceros* *Horſe* *Stag* *Antilope* *Dolphin* *Porpoiſe*	The two lobes have only two notches.
Gazelle *Chamois* *Ram* *Goat*	Three.
Seal	Six.
Northern lamantin	Two large and one ſmall.
Whales	Two large and one ſmall.
Ruminants without horns	Reſemble the human ſubject.

The lobes of the liver in mammalia, from being more diſtinct, are thinner in their form, and have ſharper edges than in the human ſubject. Differences in the figure of this viſcus are, however, immaterial, as they do not affect its functions.

The intimate ſtructure of the liver is eſſentially the ſame in man and mammalia. The laſt branches of the vena portæ terminate in both in the ſame manner, and give origin to the excretory ducts.

The chief varieties in the biliary ſyſtem of mammalia are produced by the number and ſituation of the trunks of the hepatic ducts, and the abſence of the gall-bag.

The *gall-bag* is not found in the following inſtances; *viz.* many of the *ſaltigrade* order, as the *common rats* and *mouſe*; the *hamſter*, the *mus talpinus*, *mus minutus*, *mus agrarius*, *mus ſongarus*, *mus phæus*, *mus arenarius*, *mus acredula*; in the *Hudſon's Bay porcupine* (*hyſtrix dorſata*); all the *tardigrade mammalia*; amongſt the *many-hoofed quadrupeds*, the *elephant*, the *rhinoceros*, the *daman*, and the *pecari*. Of the *ruminants*, the *camel*, *dromedary*, and *ſtag*; all the *ſolipeda*; the *northern lamantia*; and the *cetacea*, according to Hunter, although Cuvier only ſtates the *porpoiſe* and *dolphin* as wanting the gall-bag.

In ſome mammalia there is a dilatation in the courſe of the bile to the inteſtine, which may anſwer ſome of the purpoſes of the gall-bag. This dilated part is moſt remarkable in the *elephant*, on account of the numerous diviſions in it. Upon the biliary duct entering the coats of the duodenum, it becomes enlarged into an oval ſac, which is irregularly divided interiorly: ſome of the ſepta are placed nearly tranſverſely, but in ſuch a manner as to produce the effect of a ſpiral valve. They create four principal apartments: two other ſepta placed at the ſeparation of the firſt, in the longitudinal direction, form as many more pouches. There is at laſt a ſmall cell which precedes the four principal ones, and which opens into the firſt of theſe. It receives the orifice of the pancreatic duct upon its ſide, and that of the biliary duct in the direction of its axis. This reſervoir of the bile and pancreatic juice opens into the inteſtine by a moderately ſmall orifice.

In the *horſe*, the *aſs*, &c. the biliary duct becomes very much dilated before it reaches the duodenum.

In the *northern lamantin* the hepatic duct likewiſe is greatly enlarged, and receives the pancreatic duct before it paſſes into the inteſtine.

We have obſerved that the biliary duct of the *grampus* enlarges, before its termination, in what has been called the fifth ſtomach. The ſame has been noticed by Hunter in the *cetacea* generally.

There are ſometimes dilatations of the common duct of the liver and of the gall-bag, even when the latter organ exiſts. In the *cat* genus, the ductus communis choledochus forms, in the parietes of the duodenum, a ſac, which is divided by a membranous ſeptum into two cavities, one of which receives the pancreatic duct.

In the *otter*, the common duct ſwells into an oval ſac on the outſide of the duodenum, and becomes contracted again to the original ſize before it penetrates the inteſtine.

In the *kanguroo*, the common biliary duct of the liver and gall-bag is large, and joined to the pancreatic before it reaches the duodenum. It is deſcribed by Cuvier as having thick glandular coats, and being furniſhed with ſtrong bands internally, which render its inner ſurface cavernous. The cells thus produced are deep, and have their mouths directed towards the inteſtine. The pancreatic duct, although conjoined for a certain diſtance with the other, is ſmooth internally. The orifice of theſe ducts in the duodenum has neither dilatation nor valve.

The ſituation of the *gall-bag*, with reſpect to the liver, appears to be the ſame in all mammalia. In ſome ſpecies, however, it is more imbedded into the ſubſtance of that viſcus than in others. Cuvier ſtates, that the gall-bag of the *opoſſum* is buried as far as the ⅘ths of its ſurface in the parenchyma of the liver.

The figure of the gall-bag is moſt commonly pyriform. Cuvier ſtates it to be elongated, and approaching a cylindric ſhape in the *badger*, *coati*, *otter*, *weaſels*, and *civet*. Although, in ſome others of the ſame order, it tends to a round figure, as in the *bear*, *hedge-hog*, *mole*, and *racoon*. It is alſo round in many *bats*.

The ſize of the bag varies alſo in animals that are allied to each other in other parts of their anatomy. Thus, it is large in the *bear*, *coati*, and *hedge-hog*, and ſmall in the *mole*, *porcupine*, &c.

The ducts which carry the bile from the liver, form a greater number of trunks on the outſide of that viſcus in many mammalia than in the human ſubject. This appears to be the neceſſary conſequence of the diviſion of the liver into a greater number of lobes than exiſt in man. In ſeveral mammalia theſe trunks do not unite to form a ſingle duct, but communicate ſeparately with the cyſtic duct.

In the *monkies with prehenſile tails*, the hepatic ducts form three trunks, which open in ſucceſſion in the cyſtic duct, and the ductus communis choledochus appears to be the continuation of the latter; although, in the human ſubject, the common duct is evidently, both in direction and ſtructure, the continuation of the hepatic duct.

In the *lemur tarſius*, there are alſo three hepatic ducts which unite with the cyſtic, in order to form a ductus communis.

In the *variegated flying lemur* there are ſeveral hepatic ducts, terminating in the cyſtic ducts.

The *mole* has two hepatic ducts; one, which comes from the middle lobe, receives the cyſtic duct. The two hepatic ducts afterward unite to form a ductus communis.

The *hedge-hog* has ſeveral ducts from the liver that join with the cyſtic.

In the *cat kind*, there are many hepatic ducts united to the cyſtic duct, which is ſmall. The ductus communis undergoes, in the parietes of the duodenum, the dilatation already deſcribed.

In the *dog genus*, the hepatic duct opens into the cyſtic, near the neck of the gall-bag.

The *armadillos* and *ant-eaters* have one trunk from the liver, which joins the cyſtic at a very acute angle. The common duct is the continuation of the hepatic.

In the *echidna* there are three hepatic ducts joined to the cyſtic, near the neck of the gall-bag. The cyſtic is large, and appears to form the ductus communis.

In the *ornithorhynchus* there are two hepatic ducts which end in the cyſtic in the ſame manner.

The *elephant* has nine or ten branches from the liver: theſe form three trunks, which unite again, and make but one. It is inſerted into the duodenum, and there ſuffers the remarkable dilatation previouſly deſcribed.

In the *ſeal* one hepatic duct joins the cyſtic near the neck of the bladder, the other at ſome diſtance from it.

In ſome ſpecies the hepatic ducts terminate directly in the body or neck of the gall-bag. This has been particularly remarked in the *ox* and *ſheep*, in which animals there are ſeveral ſhort ducts leading from the liver chiefly into the neck of the gall-bag, reſembling what is found in ſome fiſhes. A ſimilar ſtructure has alſo been deſcribed in the *wolf*, *dog*, *hedge-hog*, and *hare*; but in theſe animals the hepatic ducts rather ſhould be conſidered perhaps as entering the origin of the cyſtic duct than the gall-bag itſelf. In the *vampyre bat* there is but one hepatic duct. It terminates in the commencement of the cyſtic. In all theſe caſes the cyſtic duct muſt be conſidered as ſupplying the place of the ductus communis choledochus. The deſign of the hepatic ducts opening into the body or neck of the gall-bag, is obviouſly to produce a more concentrated ſtate of the bile by retarding its progreſs into the inteſtine; but it is difficult to explain why this effect ſhould be neceſſary to animals in whom the organs of digeſtion, and the quality of the food are ſo very different.

The exiſtence of a gall-bag, whether the bile be conveyed directly into it, or by regurgitation through the ſame duct that carries the cyſtic bile out again, has neceſſarily the conſequence of increaſing the peculiar properties of the bilious fluid; it being found that all ſecretions, when accumulated in reſervoirs, become more concentrated by having their aqueous parts abſorbed. It would ſeem that the preſence of cyſtic bile is required more eſpecially to carnivorous animals that have a rapid digeſtion, as the gall-bag is only wanting in vegetable eaters, if we except the *cetacea*.

The diſtance from the pylorus at which the bile is poured into the inteſtine, was formerly conſidered as determining the digeſtive powers of the animal, it being ſuppoſed that the biliary duct opened neareſt the pylorus in the moſt carnivorous quadrupeds. A further knowledge of comparative anatomy has ſhewn that no general concluſion of this kind can be drawn. There is great variety, even amongſt animals nearly allied in other circumſtances, with reſpect to the ſituation of the orifice of the biliary duct in the duodenum. Cuvier ſtates that it is nearer the pylorus in the *ſaltigrade* quadrupeds generally, than in other mammalia, and at the ſame time the fartheſt removed in the *kanguroo*, which belongs to the ſame order.

In *Plate* VI. of the *Anatomy of Mammalia*, *fig.* 1. repreſents the ſac into which the biliary and pancreatic fluids are poured in the *elephant*: *a* is the hepatic duct, formed by two branches, which are compoſed of nine or ten leſſer ones; *b*, the pancreatic duct which paſſes to the cellular receptacle of the bile; *c* is that receptacle laid open, in the cavity of which the ſepta and apartments already deſcribed are to be perceived; *d*, the parietes of the duodenum. *Fig.* 2. exhibits the receptacle of the bile and pancreatic fluids in the *otter*: *a*, the biliary duct; *b*, the pancreatic duct; *c*, the external form of the receptacle; *d*, a portion of the duodenum.

Pancreas.—In moſt mammalia this viſcus has lobes, branches, or proceſſes, which make its form different from that of the human ſubject.

In the *ourang-outang* the pancreas reſembles, in its figure, the ſame gland in man. It has an irregular form in the *Barbary ape*. In the other *monkies*, the end towards the right ſide is divided into ſeveral proceſſes.

In the *mole*, *hedge hog*, *racoon*, and *bear*, there are two branches or proceſſes in the right end of the pancreas. The *badger* has it bent into an arch. In the *ſhrew*, the left end is ſeparated into two forked proceſſes.

The *cat* genus has the pancreas compoſed of two irregular ſhaped lobes, the ſmaller one accompanies the duodenum from before backwards. The larger lobe is ſituated tranſverſely. The *dog* has the gland formed nearly in the ſame way. The *martin* (*muſtela foina*) has the pancreas doubled upon itſelf, ſo as to reſemble, according to Cuvier, an overthrown figure of 6, thus ∽. In the *viverra genetta*, and *viverra zibethica*, this gland is a thick, compact, broad band, which reaches from the duodenum to the ſpleen.

In the *beaver*, the pancreas is long and thin, and accompanies the convolutions of the duodenum. In the *water rat* the pancreas has three long thin branches.

The *echidna* has ſeveral branches or proceſſes.

The pancreas of the *elephant* is long and narrow, and without any offsets; it is ſaid to be 6½ feet long.

In the *ox* this gland has the figure of a lozenge.

The pancreas of the *horſe* has an irregular figure, and three proceſſes.

In the *ſeal* the pancreas has diſtinct lobes.

The *northern lamantin* has two branches to the pancreas.

In the *cetacea*, at leaſt the genus *delphinus*, there is an irregular ſhaped pancreas, conſiſting of ſome roundiſh lobes maſſed together. The gland is ſmall, in proportion to the ſize of the animals.

However the form of this gland may differ in the various genera of mammalia, the organization is uniformly the ſame in all, and does not differ from that of the human pancreas.

As the pancreas of mammalia has frequently branches or lobes, the excretory duct is often found made up of ſeveral others.

The *ourang-outang* has the duct formed as in man, and ending in common with the ductus communis choledochus. The pancreatic and biliary ducts are in the other *monkies* united in ſome ſpecies, and diſtinct in others.

The *dog* has commonly two pancreatic ducts, one unites with the common biliary duct, and the other paſſes into the duodenum, a little diſtance farther on. In the *cat*, the biliary and pancreatic ducts enter together. The *panther* has them ſeparate, and the duct of the pancreas penetrates the inteſtine after the other. The biliary and pancreatic ducts unite, however, generally in the *carnivorous* quadrupeds.

They are diſtinct in the *porcupine*, and enter the inteſtine at ſome diſtance from each other. They are alſo remote in the *hare*. In the *marmot* the ducts are ſeparate, but enter the inteſtine near each other. The *flying ſquirrel*, *kanguroo*, and many other *ſaltigrade* mammalia, have but one orifice for the biliary and pancreatic ducts.

In the *elephant* the pancreatic duct has two principal branches, one opens into the beginning of the dilated part of the biliary duct, and the other paſſes into the duodenum at a little diſtance.

In the *cloven-footed* quadrupeds the biliary and pancreatic ducts are commonly united.

In the *horſe* they are ſeparate, although cloſe to each other.

In the *northern lamantin*, and in the genus *delphinus*, these ducts are united.

If one may judge from the variety that is to be observed, with respect to the insertion of the biliary and pancreatic ducts, both as to their conjunction, and the distance of their orifices from the pylorus; these circumstances are unimportant in themselves, and have very little concern with the functions of the pancreas or liver.

In *fig.* 5. *Plate* IV. of the *Anatomy of Mammalia*, the letter *h* indicates the pancreas of the *porpoise*. In *Plate* VI. *fig.* 3. exhibits the curious form of the pancreas in the *martin* (*mustela foina*).

Spleen.—The situation of this organ is as nearly as possible the same in all mammalia. It is always attached to the great or left end of the stomach, when the latter is a simple cavity; and when it is composed of more than one cavity, the spleen is connected with the first stomach, or that in which the œsophagus terminates. Thus, in the *ruminating* quadrupeds, the spleen is placed on the left side of the paunch, and in the *cetacea* upon the first cavity, or that which is the receptacle of the food in those animals. It is retained in its situation by reflexions of its peritoneal coat, and is likewise connected by its blood-vessels with those of the first cavity, or of the great end of the stomach.

The form of the spleen is very various, and is likewise subject to a change of bulk, and, in a degree, of figure, according to the different states of the distension or fulness of the stomach; it being well known that the spleen, from its spongy structure, is easily compressed by the adjoining viscera.

Cuvier has inserted the figure of the spleen, as he found it in several species. We shall extract the following from his "Anatomie comparée."

The *monkey* kind differ much with respect to the shape of this organ; thus it is triangular in the *long-armed ape*, the *ribbed-nose ape*, the *baboon*, the *simia apella*, the *orange ape*, and the *sajou*, &c. It is broad posteriorly, and divided into two lobes in the *Chinese ape*, and *Barbary ape*. It is long and narrow in the *weeping monkey*, and in the *ring-tailed macaco*, the *lemur mongoz*, and the *lemur macaco*. It is broader posteriorly than before in the *tardigrade lemur*. It is very long, and has the figure of a triangular prism, in the *howling baboon*. In the *lemur tarsius*, the spleen has the shape of an irregular leaf, notched upon the edges.

The *carnivorous* quadrupeds generally have this viscus long and narrow, prismatic or flattened. It has a similar form in the *bats*, the *mole*, *chrysocloris*, *hedge hog*, &c.

In the *galeopithecus variegatus*, and *Virginian opossum*, it is triangular. In the *brown phalanger* it is in three lobes, and has a similar figure in the *Mexican opossum*, and the *marmose* (*didelphis murina*).

The spleen is large and oval in the *weasel*.

This organ is triangular, broad, and flat, in the *kanguroo rat*, *water rat*, and *guinea-pig*. Very long, narrow, and thin in the great *kanguroo*; long and narrow in the *marmot*, *common rats*, and *hare*. The figure of the spleen is said to vary in different individuals of the *porcupine*.

The *echidna* has three branches to the spleen. It is larger than the stomach in the *ornithorhynchus*, and square.

The spleen is very long in the *elephant* and *hog*; broad and flat in the *rhinoceros*; of a semilunar form in the *daman*.

It is round and flat in the *stag*; thin and oval in the *gazelle*; flat, large, and semilunar in the *lama*. It is broad and thin in most of the other *ruminating quadrupeds*.

The *horse* has a flat triangular spleen.

The most remarkable deviation of structure is found in the *cetacea*. The *porpoise* and *dolphin* have, according to Cuvier, seven small round spleens of various sizes, from the bulk of a chesnut to that of a grain of corn. We have counted but five spleens in the *porpoise*. It is probable they vary both in number and size. They are scattered over the first stomach in the course of its blood-vessels, from which they receive their branches. In the *grampus* we did not observe these small spleens, but found a long stripe of a spongy substance, which appeared to be the spleen. We do not wish, however, to speak positively, as it was paler and closer in its texture than the spleens of other animals, and the parts surrounding it were so much injured in being taken out of the animal, that we could not satisfactorily make out their connections. This stripe was two feet long, and about one inch broad for its greatest extent. Towards the root it becomes gradually wider, and where it appears to originate, it is three inches broad. Hunter states the spleen in the *whales* to be very small.

The variations as to bulk are not very material in the spleens of mammalia; the *herbivorous* quadrupeds appear to have the organ largest, and perhaps the *cetacea* should be considered as having the smallest spleen.

The colour of this viscus is generally deeper in mammalia than in the human subject.

No satisfactory account has yet been published of the intimate texture of the spleen in mammalia. As far as our observation extends, the organization is essentially the same in this class of animals as in man. In the spleen of the *ox*, *sheep*, *horse*, and *hog*, &c. the cellular structure described by Malpighi and Stukely is more apparent than in man, or the small quadrupeds; and the ramification of the blood-vessels upon these cells is discoverable. Mr. Home relates, that he saw these cells very distinctly when in a distended state. He says that the roots of the splenic vein arise from the outside of the cells at right angles to their circumference, like radii. When the injection has not been very minute, they are seen to arise at so many points of the capsule: but when the injection has got into smaller branches, their number is so much increased, that they appear to form plexuses round the cells. Mr. Home also found invariably that the grains described as glands by Malpighi, and called corpuscles by Cuvier, are distinct cells, which contain a fluid, when the stomach had received an unusual quantity of liquids. This fluid was evacuated by puncturing the cells when their membranous coat became visible. Mr. Home further ascertained, that the trunk of the splenic vein, compared with that of the artery, was in the proportion of five to one in its size, by which it appears that the veins of the spleen exceed the size of its arteries in a greater degree than is observed in the other organs of the body. Much, however, remains to be done in order to explain the anatomy of the spleen. To us the cells have appeared of different sizes, and to have a very free communication with each other, by which the organ, particularly towards the surface, resembles a good deal the texture of a sponge. We are doubtful whether the cells have coats proper to themselves, or whether they are not formed by the interspaces of the parenchymatous substance. The blood-vessels appear to communicate with the cells only by their ultimate and most minute ramifications. Cuvier states that the texture of the spleen is very loose in the *ornithorhynchus*, and that its vessels are much developed.

Fig 5. *Plate* IV. of the *Anatomy of Mammalia*, gives a view of some of the spleens of the porpoise upon the first stomach, as pointed out by the letters *i*, *i*, *i*, *i*.

Peritoneum and its Processes.—This membrane has the same structure in mammalia as in man; but the reflections of it, which form the omentum, and the envelopes of the intestinal teftinal canal, differ confiderably in their figure and extent in fome quadrupeds. The form and extent of the mefentery, mefocolon, and meforectum, depend upon the length and convolutions of the fmall and great inteftines, and may be in fome meafure calculated from the previous defcription of the inteftinal canal. The ufes of thefe parts are precifely the fame as in man.

The great *omentum* varies in length in different mammalia, but in moft of them it is longer than in the human fubject. In fome fpecies it not only covers the front of the inteftines, but extends into the pelvis, and is reflected forwards the length of the rectum. This reflection of the omentum is attached to the bladder, rectum, meforectum, and to the fides of the peritoneum. The omentum is thus extended in many fpecies of *monkey*, but the length of this membrane does not correfpond with the agreement of the animals in general ftructure. Species nearly allied have it very different; for inftance, in the *brown bear*, it does not pafs below the middle of the abdomen, and in the *racoon* and *badger* it reaches to the pubis.

The layers of the omentum have not always the fame origin and connections as in man, which arife from the want or the prefence of the tranfverfe mefocolon. There is no omentum to the colon, or appendices epiploicæ in the carnivorous mammalia.

The *ruminating quadrupeds* have the cavity of the principal omentum very large. It inclofes the four ftomachs, the duodenum, and the pancreas.

The fat, which is depofited between the layers of the omenta, is found in all mammalia, but in greater quantity in the *herbivorous* than in the *carnivorous* tribes.

Some of the *hibernating* quadrupeds; for inftance, the *Alpine* and *Polifh marmots*, the *fuflic* (*mus citellus*), the *fat fquirrel* (*myoxus glis* of Gmelin), and the *jerboa*, have lateral omenta in addition to thofe of other mammalia. Thefe arife from the loins, cover the fides of the abdomen, fometimes even coming as far as the middle of the belly. About the period of hybernation, thefe proceffes of the peritoneum become, as well as the other omenta, loaded with fat, which is expended during the time that the animals remain torpid. The ufe of the lateral omenta is, therefore, fufficiently obvious, and yet it is very extraordinary, that they fhould be wanting in other fpecies that fleep during the winter, fome of whom alfo are nearly allied to thofe above mentioned; as, for inftance, the *garden fquirrel* (*myoxus nitela*), the *common dormoufe* (*myoxus mufcardinus*), &c.

Abforbent Syftem.—This part of the anatomy of mammalia fo much refembles what has been difcovered in the human fubject, that there has been no inducement to inveftigate it minutely; we, therefore, poffefs no detailed account of the abforbent fyftem of this clafs of animals.

The chief varieties which have been obferved, relate to the number and fituation of the abforbent glands, and the form of the thoracic duct.

The *glands* are lefs numerous, generally fpeaking, in quadrupeds than man: they are alfo commonly larger. The *mefenteric glands* are perhaps in moft quadrupeds affembled together into one or more maffes; befides thefe maffes, there are often fome diftinct glands in the mefentery. It is at the root of the mefentery that the glands are congregated into the chief mafs. They are connected with each other by means of cellular fubftance, and prefent an unequal furface externally. The affemblage of the mefenteric glands was miftaken for a pancreas by Afellius, and have ever fince retained the name of *pancreas Afellii*. In the *bear*, the *mole*, the *brown phalanger*, &c. there is only one mafs. The *cat* kind, and perhaps all the *digitigrade* quadrupeds, have one principal mafs or clufter at the root of the mefentery, and near this fome fmaller ones. Cuvier ftates them to be the fame in the *dolphin*. The pancreas Afellii is very large, and of an elongated figure in the *feal*. There are two maffes of the mefenteric glands in the *weafel*.

In the *flying lemur*, the *common rat*, and the *cloven-footed* quadrupeds, the glands are difperfed over the mefentery. We have found them fo likewife in the *grampus*. It is probably the fame in the other *cetacea*. The cellular ftructure of the abforbent glands is very apparent in the *horfe*, *afs*, &c.

A very fingular ftructure has been defcribed in the mefenteric glands of the *whale* by Mr. Abernethy. He reprefented them as forming round bags, about the fize of an orange: thefe facs contained a flimy fluid, which was apparently a fecretion of their own. The lacteals not only terminated in thefe bags, but formed a plexus upon their furface. The blood-veffels likewife ramified upon the coats, and communicated with the cavity of the bags, fo that a waxen injection paffed into it. We feel inclined to confider the cyfts defcribed by Mr. Abernethy on the mefentery of the *whale* as a morbid ftructure, as we have found nothing of the fame kind in thofe *cetacea* we have diffected, and as it has not been obferved by Hunter, Cuvier, Blumenbach, or any other comparative anatomift, as far as we know.

The *thoracic duct* has generally in mammalia a confiderable dilatation of its origin, or a large *receptaculum chyli*. The bulk and courfe of the thoracic duct are liable to vary amongft individuals of the fame fpecies, more particularly in domeftic quadrupeds. Sometimes there is an annular dilatation at the upper part of the thoracic duct in the *dog*, which has been reprefented by Vans Bils as a conftant ftructure, which he called the *receptaculum tortuofum*. The thoracic duct is double in fome quadrupeds. It is fo in the *dog*. Cuvier defcribes the duct in the *dolphin* as being complicated, and at laft terminating in two branches, which open befide each other into the jugular vein. Mr. Home found in the *fea otter* the receptaculum chyli large, and the thoracic duct compofed of two tortuous branches, which make many convolutions and communications with each other, and terminate feparately.

Mr. Bracy Clarke has ftated, that he found the thoracic duct of the *horfe* forming feveral lateral communications at the lower part with the lumbar veins. (See Anatomy, *Veterinary*, in this dictionary.) We cannot, however, help doubting the accuracy of the obfervation, as this fact would form fo extraordinary an exception to the fyftem of abforption, as it has been proved to exift in all the higher claffes of animals.

Doubtlefs there are many varieties in the form of the thoracic duct, and the diftribution of the abforbent veffels in mammalia, which have not yet been obferved: but as they probably would not throw any light upon the function of abforption, they are but of little importance.

Heart.—This organ in mammalia correfponds in all material circumftances with the heart of the human fubject. It is in every inftance enclofed in a *pericardium*, notwithftanding Blafius, Peyer, Harder, Tozzetti, &c. have reported that this membrane is wanting in the *hedge-hog*. Blumenbach accounts for thefe anatomifts having made fuch a miftake from the thinnefs of the pericardium in the *hedge-hog*; but to us this membrane has appeared not to be unufually thin, confidering the fize of the animal.

The pofition of the heart in the body is rather different from that of man. It is fituated more in the direction of the animal's body, and refts rather upon the fternum than the diaphragm. We ought to except from this obfervation the

the heart of the *ourang-outang*, which is placed obliquely in the breaft, with the point turned towards the left fide, as in man. It muft have been from the diffection of quadrupeds, that the cavities of the heart firft received the names of *right* and *left*, which are not ftrictly applicable to their fituation in the human fubject.

There are fome differences in the relative fize of the cavities of the heart, and in the thicknefs of the parietes of the right and left ventricles in mammalia, which are pointed out by Cuvier. He has alfo defcribed fome varieties in the form of the valves. As thefe are unimportant, we fhall refer the reader to Cuvier's "Anatomie comparée," tom. iv. for the details. It is neceffary to ftate that the valve of Euftachius is not found to exift in certain fpecies; as the *lion*, the *bear*, and the *porcupine*. It is ftrong and mufcular in the *feal*. In the *elephant* this valve is fpiral, and is continued for the length of the fuperior parietes of the finus, with the left and pofterior extremity of another broad femilunar valve, that feparates the orifice of the right and anterior vena cava from the cavity of the appendix of the auricle.

There are two fuperior, or more properly fpeaking anterior, venæ cavæ in the *elephant*; one left, the other right. The firft opens into the finus of the auricle, near the mouth of the ventricle. The fame is obferved in the *porcupine*. The *kanguroo* has alfo two fuperior or anterior cavæ. Mr. Carlile ftates, that the *hybernating quadrupeds* have the fuperior cava divided into two trunks; the left paffes over the left auricle of the heart, and opens into the inferior part of the auricle near to the orifice of the inferior vena cava. In fome of the *ruminating quadrupeds*, and in the *pig*, there are two fmall flat bones at the origin of the aorta from the heart. It has been fuppofed that they fupported the aortic valves. See C. J. Keuchen de Officulis et Cordibus Animalium.

A very common error, with refpect to the anatomy of the heart, is the fuppofition that the quadrupeds which inhabit the water, and the *cetacea*, have the foramen ovale fo much unclofed, that the two auricles communicate. The opinion has received fome fupport from this communication being actually found to exift in a very few inftances. Blumenbach relates that he was prefented with the heart of a *feal*, in which not only the foramen ovale, but the ductus arteriofus remained unclofed. Seger found the ductus arteriofus open alfo in the fame animal. (Ephem. Nat. Curiof. dec. 1. an. 9.) The foramen ovale has been feen in an open ftate twice by Mr. Home, in the *fea otter*. In the other numerous diffections which have been made by the moft expert anatomifts of the *diving quadrupeds* and the *cetacea*, the heart has been obferved to poffefs the four cavities feparate, as in man and the other mammalia. Our own experience is amply fufficient to enable us to conclude that any communication between the cavities of the heart in thefe animals is not a natural or neceffary ftructure. That it may occafionally exift is not improbable, and that thefe animals may be particularly liable, from their habits, to fuch malformations of the heart, feems alfo not unlikely; but it would be abfurd to found an opinion upon the exceptions to what is fo well known to be the general rule. We might further add, that the foramen ovale is frequently found more or lefs unclofed in the human fubject, without having occafioned any embarraffment or peculiarity in the pulmonary circulation during the life of the perfon. We have obferved, that it is even more commonly imperfectly clofed than otherwife in the human fubject. In moft dead bodies that we have examined, we could at leaft pafs a probe obliquely from the right into the left auricle.

The *otter* has been reported to have three communications between the auricles; but thefe were nothing more than the foramina Thibefii, perhaps in an enlarged ftate.

The external form of the heart is in fome fpecies elongated, in others broad. The point is blunter or rounder in fome than others, but thefe varieties do not merit a particular notice. In the *lamantin* the figure of this organ is, however, very peculiar. It is much broader than it is long. The ventricles are actually feparated half way from their end, fo that there are two points or apices to the heart.

Arteries.—The ftructure of thefe veffels is perfectly fimilar in man and mammalia. They confift of the fame number of coats, and in general have a fimilar relation in their diameter and the thicknefs of their parietes. The quadrupeds that inhabit rivers or the fea, and the *cetacea*, are diftinguifhed by a large fize of their blood-veffels, in proportion to that of the entire bulk, or the fize of the other organs of the body. In fome *cetacea* the principal trunks have a diameter nearly equal to that of the inteftinal canal. The branches of the blood-veffels alfo in thefe animals are very large in proportion to the trunks from which they arife. The circulation appears to be much lefs free in aquatic animals than others, and hence the great fize of the veffels and the accumulation of blood in *fifhes*, which circumftances are alfo to be obferved in a lefs degree amongft thofe mammiferous animals that live in the water. It feems to us, that the arteries of the *cetaceous* mammalia have thinner coats than in other animals of the fame clafs, according to the fize of the veffels. The *pulmonary* artery in the *cetacea*, however, has nearly as ftrong coats as the aorta.

The chief varieties to be noticed in the arteries of mammalia are the different origins of the trunks; the greater fize of particular veffels; and the plexufes that are formed in certain fpecies.

The *aorta* in the *ruminating quadrupeds*, the *horfe*, the *rhinoceros*, the *hog*, the *pecari*, and probably in other inftances not yet difcovered, divides almoft immediately upon its origin into two large trunks. One of thefe, which is the fmaller, proceeds upwards, or more properly forward, in the body of a quadruped; and it correfponds to the arch of the aorta, and furnifhes the fame branches. The other trunk goes backwards, and takes the place of the defcending aorta.

The firft branches of the aorta have different origins in mammalia. In the *marmot* and *guinea-pig*, the arch furnifhes only two primary branches. One of thefe fends off the two carotids, and then ends in the right fubclavian. The other is the left fubclavian artery. Sometimes the firft of thefe branches very foon feparates into two others, one of which is the left carotid, and the other produces the right carotid and fubclavian. In other cafes, the firft of the primary arteries of the aorta furnifhes a branch which divides into the two carotids. The remainder of the artery is the right fubclavian. This laft mentioned diftribution exifts in the *lion*, *dog*, *cat*, and *bear*.

In the *dolphin*, each of the two primary branches of the arch of the aorta furnifhes the arteries of the head, and fuperior extremity, on its proper fide.

The *feal* has three principal branches from the arch of the aorta: the firft is the common trunk of the right carotid and fubclavian, the fecond the left carotid, and the left fubclavian.

The *elephant* has three branches from the arch of the aorta alfo. The lateral veffels are the two fubclavian arteries. The middle one divides into the two carotids.

The *goat* has the aorta divided, as already defcribed, into the afcending and defcending, or the anterior and pofterior, more properly called. The anterior divides into three branches:

branches: the left subclavian; the right; and a trunk that forms the two carotids.

The anterior aorta of the *horse* soon bifurcates into two branches; the trunk of the two carotids and the right subclavian arise from one branch: the other terminates in the left subclavian.

The *inferior thyroideal* artery is not commonly in quadrupeds a branch of the subclavian, but of the carotid higher up. This distribution arises from the length of the neck removing the thyroid gland so far from the usual origin of this vessel.

In the *opossums*, the *kanguroo*, and as it would appear in all the *marsupial* quadrupeds, the *brachial* artery divides very high up into the ulnar and radial arteries; in some instances as high as the middle of the humerus. The ulnar is a large vessel, and passes through a hole formed in the internal condyle of the os humeri, and proceeds from the back of the arm to the front, where it is distributed in the usual manner. Cuvier states that the brachial artery forms several branches for the supply of the portion of the fin corresponding to the *fore* arm in the *dolphin*. The very remarkable plexus which the brachial artery furnishes in the *tardigrade quadrupeds*, will be noticed hereafter, along with the other arterial plexuses.

Daubenton has described in the *descending* or *posterior aorta* of the *pecari* a large dilatation, which appears to have been an aneurism. Tyson found in the same animal three dilatations in the course of this vessel. They were divided interiorly into cells. These enlargements were probably also a morbid structure, as they have not since been observed by other anatomists.

There are some varieties to be noticed in the branches of the *cœliac* and *mesenteric* arteries. In the *cat* the cœliac sends off a branch to the right renal capsule, previous to its supplying the *hepatic*, the *coronary* of the *stomach*, and the *splenii*. In the *porcupine* the cœliac divides into two branches; one furnishes the artery of the spleen, and a large branch to the pancreas; the other gives the hepatic and coronaria.

The two *mesenterics* always are found; but when there is no marked distinction of great and small intestines, the one corresponding to the inferior mesenteric is very small. This vessel is almost exclusively distributed to the rectum in the *bear*. In the *ruminating quadrupeds* the primary branches of the superior mesenteric artery are numerous. They do not consequently form such frequent anastomoses as exist commonly. The *inferior*, or, as it should be called in quadrupeds, the *posterior mesenteric* artery, is small in these animals, and almost confined to the rectum. The remarkable anastomosis between the two mesenterics on the colon is not found.

In the *seal*, the left kidney receives two arteries from the aorta, and the right only one, according to Cuvier. This not improbably may have been a variety.

The *middle artery* of the *sacrum*, which is so inconsiderable in man, is often very large in mammalia, as it conveys almost the whole of the blood to the tail. In the *kanguroo, bear, lion, dog*, &c. it has been observed not to arise from the aorta, but to be furnished by a thick short trunk proceeding from the bifurcation of the aorta, which also in these cases sends off the *sacræ laterales* and the *hypogastric* arteries. The artery of the tail is as large in the *kanguroo* as the internal iliac. This vessel is of great magnitude also in the *cetacea*. It runs along the under surface of the tail, protected by a number of small bones, which are attached to the caudal vertebræ, to near the extremity of the tail, and form by their opposition a sort of triangular conduit, similar to that inclosing the termination of the aorta in the tail of fishes. The artery of the tail might properly be considered the continuation of the abdominal aorta in the *cetacea*; it sends off a great many branches which anastomose with each other, and unite again in a small branch under the two last caudal vertebræ.

The *primary iliac arteries* frequently do not exist in the *cloven footed quadrupeds*, the *cat* and *dog kind*, the *bears*, the *kanguroo*, &c. The *external iliacs* are formed by the bifurcation of the aorta, and the *internal iliacs* arise from a common trunk, as already mentioned. They are much smaller than the external iliacs, and separate into two principal branches, which send off the customary arteries of the internal iliac, except the *ileo lumbalis*, which comes in these instances from the external iliacs.

In the *seal* the ileo-lumbales arise from the aorta before the primary iliacs are produced.

In the *cetacea* there are no arteries analogous to the external iliacs. The aorta sends off arteries which correspond to the internal iliacs, but which only supply the bladder and genital organs.

We shall now notice the different plexuses which the arteries form in mammalia.

In the *digitigrade* quadrupeds, some of the *ruminants*, &c. the branches of the carotid, which go to meet the basillary, form so remarkable a plexus, that it was called by the elder anatomists *rete mirabile*. These branches of the carotid are suddenly dissolved into an immense number of small vessels, which are twisted and united together like a plexus of nerves. These plexuses fill up the sides of the sella turcica, and afterwards reproduce the two branches that, uniting with the basilliary artery, establish what is called the circle of Willis. It is not known in how many species the rete mirabile exists; it was formerly supposed to be universal in mammalia. The Parisian dissectors did not find it in the *monkey*, and Cuvier says it does not exist in the *elephant* and *beaver*.

Mr. Carlile has mentioned a similar plexus of the carotid artery near the jaws in the *lion. ox*, and *sheep*.

We have observed in the *grampus* a very intricate plexus of vessels around the articulation of the lower jaw. We did not ascertain whether the vessels were arterial or venous: they appeared to be both, and were lost in the apppearance of ligamentous cells.

The *intercostal* arteries in *cetacea* form a very remarkable plexus. It appears to be made by the convolution of one vessel, which measures several hundred feet in length.

The arteries of the spinal marrow also in *cetacea*, are converted into a close plexus throughout the greater part of the spinal canal. In the *grampus*, the section of the sheath of the spinal marrow exhibits a number of the orifices of these vessels all round it.

But the most interesting arterial plexuses, are those described by Mr. Carlile in the limbs of the *slow-moving animals*. In all these, as well as the *tardigrade lemurs*, as the *sloths*, the axillary and iliac arteries produce a plexus of undulating branches, which vary in number according to the species. Mr. Carlile describes the trunks of the arteries as being expended in the formation of the plexuses; but we have ascertained that the trunk of the vessel is continued beneath the plexus, in the same manner as in the plexus of the anterior tibial artery in birds where the trunk is scarcely diminished. The vessels composing the plexus in the anterior extremity of the *lemur tardigradus* amount to 23. In the inguinal fasciculus there are 17. These vessels have the same size throughout their course, and occasionally anastomose with each other.

The brachial and inguinal plexuses are larger in the *great American sloth* than in the *tardigrade lemur*. In the first Mr. Carlile counted 42 vessels, and computed from the bulk that there

there might have been above 20 more concealed in the middle of the fasciculus. He reckoned only 34 in the thigh, and those of the first series were larger than the rest. The plexus of the axillary artery in the *two toed sloth* is very inconsiderable, and disappears in the upper part of the humerus, although in the other instances it reaches to the elbow. The inguinal plexus also in this animal contains but eight vessels, which soon begin to ramify in the usual arborescent form.

In the *lori* (*lemur gracilis*) there are brachial and inguinal plexuses, the vessels of which appear to form fewer anastomoses than in the other animals. From the agreement in the distribution of the arteries in the limbs of the *slow-moving* animals, it is impossible not to admit Mr. Carlile's supposition, that this peculiar arrangement of vessels is necessarily connected with the slow operation of the muscles in those quadrupeds, although we cannot perceive why such a connection should exist.

The *rete mirabile* has evidently the effect of retarding the current of the blood to the brain, which may be more necessary to *quadrupeds*, from the frequent low position of the head, than in *man* and the *monkey*, where this plexus does not exist.

It is difficult to account for the intercostal, spinal, and maxillary plexuses of the *cetacea*, unless we suppose that they serve as reservoirs of the blood, or rather prevent an accumulation of blood in larger vessels, which might arise from their continual residence in the water, and frequent suspension of their respiration.

In *Plate* VI. of the *Anatomy of Mammalia*, *fig*. 4. represents the rete mirabile of the carotids in the *calf*, somewhat above the natural size: *a*, the sella turcica, a little pared away, to shew more plainly the plexus, *b*, on each side; *c*, *c*, are the carotid arteries; *d*, the basilar. *Fig*. 5, of the same plate, is to shew the axillary plexuses of the *tardigrade lemur*: *a* is the trunk of the axillary artery; *b*, the plexus; *c*, *c*, the arteries of the fore-arm resuming their proper form. *Fig*. 6. exhibits the plexus of the iliac artery in the same animal: *a*, the trunk; *b*, the plexus; *c*, *c*, distinct vessels for supplying the leg. *Fig*. 7. shews the axillary plexus in the *three-toed sloth*: *a* is the sub-clavian vein; *b*, the trunk of the artery behind the large veins; *c*, the remarkable plexus which the artery forms; *d*, the median nerve. *Fig*. 8. represents the brim of the pelvis and groin of the *three-toed sloth*, with the plexus of the inguinal artery: *a* is the bifurcation of the aorta into the two iliacs; *b*, a part of the internal iliac muscle; *c*, part of the bony margin of the pelvis, leading down to the pubis.

Veins.—These vessels agree in general exactly in mammalia with those of the human subject. Even where the arteries deviate in their origin from what is observed in man, the veins pursue the ordinary course.

We have already mentioned that there are two superior or anterior *cavæ* in the *porcupine*, *elephant*, the *kanguroo*, and the *hybernating mammalia*. Mr. Carlile has stated, that, in addition to the cavæ forming two trunks before approaching the heart in the quadrupeds that remain torpid during the winter, there are also two trunks to the *vena azygos*, which each open into the superior cava, on its own side of the thorax. He likewise remarks, that the intercostal arteries and veins are particularly large in those animals. Mr. Carlile wishes to infer from this distribution of the venous trunks, that it is necessary, on account of the languid circulation that is carried on when the animal is torpid; but we believe it is vain to attempt the explanation of the phenomena of hybernation by the anatomical structure of the animals concerned. The habit of retiring to rest during the winter is common to animals whose anatomy is extremely different, and if the diminished action of torpid animals were to depend upon any particular organization of their vascular system, it would interfere with their perfect circulation at other seasons. Hybernation is accompanied by a suspension of functions, not a different mode of exercising them.

In the *seal* the inferior vena cava is dilated into a large sinus, as it passes the liver, into which five large hepatic veins enter. This dilatation may be either the consequence of the animal living in an element in which its respiration, and consequently free circulation is so often interrupted, or it may be an original provision of nature, to relieve the right side of the heart, when the current of blood through the lungs is impeded during the moments the animal is under the water.

A similar contrivance seems to exist in the *horse*. There is a dilatation of the *jugular vein* behind the jaws in this animal, which may serve to relieve the brain from the pressure of the venous blood during the time this animal is feeding. The ruminating quadrupeds do not require a provision of this kind so much as the *horse*, as they often eat lying, and generally ruminate so.

The veins of the viscera appear to be provided with valves in some mammalia, like those of the members in man. According to Haller, there are valves found at the origin of the branches of the *mesenteric* and *hæmorrhoidal* veins of the *horse*; and they have been observed also in the *splenic* veins. They exist in the *pulmonary* veins of the *dog* and *sheep*. Most probably they may be found in many other instances, where they have not yet been observed.

The texture of the coats of the veins is apparently the same in man and in mammalia. Cuvier says he found the proper membrane to tear, like felt, into long silky filaments, in the axillary vein of the *elephant*, which he considers an example of the structure of this coat generally.

Vital Temperature.—That degree of heat which an animal sustains most commonly, or when not exposed to extremes of external temperature, we have called the natural *standard*. The standard heat of *mammalia* is several degrees higher than in *man*, although still below what is found to be the natural temperature of *birds*.

The thermometer, when introduced into the rectum or urethra of a man, (for the standard can only be ascertained in the cavities,) rises to 97°.

The following experiments were made by Mr. Hunter, and shew the difference in quadrupeds.

The ball of the thermometer [in every case we are to be understood as speaking of Fahrenheit's scale] being introduced two inches within the rectum of a healthy *dog*, the quicksilver rose to $100\frac{1}{2}$° exactly. The chest of the *dog* was opened, and a wound made into the right ventricle of the heart. Immediately on the bulb being introduced, the quicksilver rose to 101°.

A wound was next made into the substance of the liver, and the instrument being inserted into it, rose to $100\frac{3}{4}$°. It was next introduced into the cavity of the stomach, where it stood exactly at 101°.

The thermometer was introduced into the rectum of an *ox*, and the quicksilver rose to $99\frac{1}{2}$°.

When inserted into the rectum of a *rabbit* it stood also at $99\frac{1}{2}$°.

Doctor Martine, in his Essays upon Thermometers and Heat, states that the temperature of the surface of the body is from 100° to 102°, or sometimes 103°, or a little more, in ordinary quadrupeds, as *dogs*, *cats*, *sheep*, *oxen*, *swine*, &c. in which he is certainly incorrect. We have been led to ascertain the usual temperature of several quadrupeds, previous to making different experiments that would be irrelevant

vant to our prefent purpofe, if related here; but we may ftate that we have always found the heat of the cavities of the body to be about 99°, 100°, or 101°, when the quadrupeds were placed in a medium natural to them, and that of the furface of the body, two, three, or more degrees, according to circumftances, below that of the interior of the body. In quadrupeds, generally, we conceive the *ftandard* temperature fhould be ftated to be 100°.

The heat in *cetacea* we fhould fuppofe to be equal to that of quadrupeds, or perhaps higher. The quantity of oil interpofed between their internal parts and the water would feem to be fufficient to prevent the abftraction of heat, and that circumftance, joined with the want of evaporation from the furface, might even tend to exalt the temperature of the interior part of the body. Boerhaave confidered the heat of cetacea to be the fame as in quadrupeds, but he rates it in both too low. Mr Richer found the blood of the *porpoife* to be as warm as the blood of land animals. Du Ham. Hift. Ac. Sc. P. M. 157, and Mem. de l'Acad. des Sc. 1666—1668. Dr. Martine relates that he found upon trial the heat of the fkin of the *fea-calf* (*phoca vitulina*) to be near 102°, and in the cavity of the abdomen it was about a divifion higher.

We may fafely conclude from the facts before us, that the ftandard temperature in all mammalia furpaffes the human by a few degrees. In what manner can this fact be explained? fhould it be attributed to there being lefs evaporation from the fkin; or the natural integuments of mammalia being better calculated for retaining the vital heat? We do not pretend to anfwer thefe queries, but we fhall obferve that although the natural clothing of an animal evidently tends to preferve its temperature from the influence of external cold, it does not feem capable of giving a higher ftandard. We cannot believe that the ftandard of a *bear* could be altered by depriving the creature of its fur.

Mammalia have, both from their ufual coverings, and the high natural ftandard, great powers of refifting the effects of external cold. Many of them are expofed to great extremes of temperature in the northern climates, in which they fuffer more than birds, from fleeping on the ground. Mr. Hunter failed to freeze a *dormoufe*, when furrounded by a freezing mixture, until he wetted its hair with water. And in another experiment, a *moufe* which he had placed in an atmofphere as low as 13° above 0 during an hour, had not its heat diminifhed more than 16° at the diaphragm, and only 18° in the pelvis.

Like all other animals, however, which poffefs a high ftandard, when this is brought very low in mammalia they perifh. When in a torpid ftate they fuffer a great reduction of their natural temperature, with the fame impunity as the more imperfect animals. Thus, in an atmofphere of 26°, a torpid *hedge-hog* was only 30°, although the fame animal, when roufed, was expofed for two days to the fame atmofphere, and the internal heat, as tried by the rectum, did not fink below 93°.

Lungs.—Thefe organs have their general figure regulated, in fome degree, by the fhape of the thoracic cavity. In thofe fpecies which have the cheft fhort it is commonly wide in proportion, and the convexity of the diaphragm is not confiderable; and, on the contrary, where the thorax is long, it is often narrowed and diminifhed in the longitudinal direction, by the diaphragm being very convex, or projecting far into the cheft. In the *rhinoceros*, *horfe*, *elephant*, and *two-toed floth*, the diaphragm paffes up into the thorax, far beyond the margin of the ribs, fo that it receives a part of the abdominal vifcera. The volume of the lungs is, therefore, ftill preferved in due proportion to the fize of the animal, notwithftanding the external form of the cheft might fometimes make it feem otherwife.

The lungs of mammalia are commonly divided into a greater number of lobes than thofe of the human fubject, although there are fome fpecies which have them lefs fo, or even not feparated into lobes at all. The number of the lobes of the lungs is not conformable to any natural claffification of mammalia, but varies even amongft individuals of the fame fpecies.

Cuvier has given in his "Anatomie comparée," tom. iv. a very full table of the divifions of the lungs of mammalia by lobes and fiffures, from which we fhall felect the following account.

In the *ourang-outang*, there are three lobes in the right lung and two in the left, as in man.

The *long-armed ape* has four in the right, and only a fiffure in the left. The reft of the *monkey* genus have commonly four lobes in the right, and two in the left lung: in fome of thefe there are fiffures.

The *lemurs* have four or three lobes to the right, and two or three in the left lung.

The *flying lemur* and the *common bat* have the lungs undivided, except by fiffures. The *great* or *ternate bat* of Edwards, has four lobes in the *right*, and three in the *left* lung.

The *plantigrade* mammalia have generally four in the right, and two or three in the left. The *common hedge-hog* has, however, four in the right lung, and no divifion of the left.

In the *digitigrada* there are four lobes in the right, and three or two in the left.

The *marfupial* quadrupeds (except the *kanguroo-rat*) have the left lung undivided, or flightly fo, by one fiffure. The *phafcolomys* has no lobes, but two fiffures in the right lung. The *kanguroo-rat* has four lobes in the right lung, and two in the left. The *Virginian opoffum* has three in the right lung: the other fpecies of *didelphis* have either three lobes, or two and a fiffure to the right lung.

The *faltigrade* quadrupeds have moft commonly the right lung divided into four lobes, and the left is frequently entire. When the left lung is divided, it is ufually into two lobes; but in the *Hudfon's Bay rat* there are four lobes, and in the *jerboa* three. The *porcupine* has fix lobes to the right lung, and five to the left.

In the *edentata* there are two, three, or four lobes to the right lung, and either two or none in the left.

In the *elephant* and *rhinoceros*, both the right and left lungs are without lobes. The *daman* has two fiffures to each lung. The *wild boar* has three lobes in the right lung, and two in the left. The *Siamefe hog* has four in the right, and two in the left lung.

The *ruminating* quadrupeds have generally four lobes in the right lung, and two in the left. The *lama*, however, has the left lung only divided by a fiffure.

In the *folipeda* there are no lobes to the lungs of either fide.

The *feal* has two lobes in the right lung, but none in the left. The *lamantin* is without lobes.

The *cetacea* have not their lungs divided into lobes.

Some of the *mammalia* are faid to have the lungs adhering to the parietes of the cheft. The *elephant* is reported to be an inftance of this kind, and Tyfon has alfo ftated it to be the cafe in the *web-footed* and *cetaceous* mammalia. In thofe fpecies we have examined the lungs have been free, as in the human fubject. In the *cetacea* the coats are ftrong, and the lung altogether feels firm and flefhy. Hunter ftates, that the lungs of *cetacea* poffefs fo much elafticity,

city, that they are of themfelves fufficient to exprefs the air from their cells. He alfo reprefents the air-cells as being fma'ler than they are in quadrupeds.

The intimate organization, which confifts in the diftribution of the arteries, veins, and the air-tubes, is perfectly the fame in all mammalia and in man.

Bronchial Gland.—The ufe of this part not being eftablifhed by anatomifts, it cannot have a proper place affigned to it according to any phyfiological arrangement. We fhall, therefore, defcribe it next to the lungs, from its contiguity to thefe organs in the body, without endeavouring to fhew any connection between the functions of the bronchial gland and refpiration.

The fize of the bronchial gland is greater in the human fubject than in any other animal. In proportion to the entire bulk, there is very little difference obferved in mammalia, except in the *kanguroo*, which has a particularly fmall bronchial gland.

This gland is compofed of two lobes, as in man; but they are fometimes quite unconnected with each other, as in the *bat*, in fome fpecies of *rat*, the *elephant*, the *daman*, the *folipeda*, and the *feal*. Moft commonly the two lobes are conjoined by one or fometimes two thin ftripes, which pafs over the front of the trachea.

The form of the lobes varies in different fpecies. They are broader above than below in the *bat*, elongated in the *plantigrada*, long and flattened in the *cat* kind generally, ftill longer and cylindrical in the genus *viverra*. In the *faltigrada* the lobes are elongated, and not quite cylindric, being thicker above than below. The figure of the gland varies in the *ruminants*. It is round and tolerably large in the *lama*, longer in the *ox*, *fheep*, and *antilope*.

In the *folipeda* the gland is but little elongated, and fituated far below the larynx.

Hunter denied the exiftence of the thyroid gland in the *cetacea*, but Cuvier afferts that he found it very diftinctly in many *porpoifes* and *dolphins*, confifting of two parts fufpended to the trachea, oppofite to the fuperior, or rather anterior edge of the fternum. We have not perceived it in the *porpoife* or *grampus*, perhaps from not feeking it far enough from the larynx.

In *man* and the *monkey* the cellular fubftance connects the thyroid gland clofely to the fides of the trachea, but in the other mammalia this connection is loofer. It is fo much fo in the *rabbit*, *guinea-pig*, and fome other of the *faltigrade* quadrupeds, that the thyroid gland is moveable.

The internal ftructure of the thyroid gland appears to be the fame in man and mammalia. The obfervations that have been made upon it in the *elephant* have tended to explain its organization, as from the fize of the animal the gland is large. It is furrounded by a thick aponeurofis, in the fubftance of which the thyroid veffels divide before they penetrate the gland. Each lobe of the gland is compofed of about thirty lobules having a firm texture, and feparated by peculiar cells, which are made by an extremely fine membrane. Thefe cells are but flightly connected with each other, and with the lobules which furround them, fo that they appear to ferve only as the foundation for the fmalleft ramifications of the veffels that enter the gland. It is by means of thefe veffels, rather than the cellular tiffue, that the different lobules are joined together.

According to Steller, the *northern lamantin* has the thyroid gland very large; it contains two fluids, differing from each other in colour and confiftence. The external part of the gland is compofed of a number of very fmall grains, and of a fluid refembling milk in colour and confiftence, and having a fweet tafte. There is a membranous fac in the middle of the gland, containing a thick and rather bitter fluid. It feems to be fecreted by the grains, and depofited in the fac.

The exiftence of cells fo plainly proved in the thyroid gland of thefe large animals, feems to juftify the opinion entertained by fome anatomifts, that the cellular ftructure obferved in bronchocele is produced by the natural cells of the part becoming enlarged.

It is a remarkable circumftance, which may throw fome light upon the functions of the thyroid gland, that it only exifts in man and mammalia. Cuvier feems inclined to confider a round cellular gland placed before the heart in the *ferpents* as analogous to the thyroid of mammalia. It does not feem probable, however, that an organ fhould be wanting in *birds*, and re-appear in certain animals of a clafs one ftep farther removed from mammalia.

Kidnies and Urinary Bladder.—The pofition of the kidnies in the abdomen is different in man and mammalia, inafmuch as the latter commonly have the right kidney higher than the left.

The kidnies of mammalia ufually poffefs the figure of the human. In the *cat kind*, the *coati*, the *armadillo*, the *gazelle*, &c. they are more or lefs round. In the *ruminating* quadrupeds, the *paca*, the *hog*, and the *porcupine*, &c. according to Cuvier, they are long-fhaped. The *lama* has them nearly cylindric. They are fhort and triangular in the *horfe*.

In *man* and fome *mammalia* the kidnies before birth are in feparate lobules. In thofe mammalia that inhabit, or frequently vifit, the water, and in a very few others, thefe glands preferve the diftinctly lobulated appearance during life. The original lobules can, however, be always perceived, and reckoned from the number of their papillæ. They may be injected alfo with different coloured fluids, and not occafion any confufion, although they are confolidated into one mafs.

The *elephant* is one of the animals which have lobulated kidnies. They are, however, not much divided, there being only four lobes to each in this animal. The texture of the *elephant's* kidnies is foft, and the diftinction of the cortical and medullary fubftances is not plain. There are three papillæ, and as many infundibula, which join together without forming a pelvis.

The kidnies of the *ox* are ftill more divided than in the *elephant*, having from 23 to 30 lobes.

It is in the *otters*, *bears*, *feals*, and *cetacea*, that the lobulated ftructure is moft diftinct. The lobes are numerous and fmall in proportion, according to the fucceffion of thefe animals. Thus, in the *otter* there are ten lobes to each kidney; in the *bear* there are from 50 to 60; the *feal* has 120 to 140; and in the *porpoife*, *dolphin*, *grampus*, &c. there are upwards of 200. In the *cetacea*, the lobules or glands of which the kidnies are compofed, are particularly diftinct and fmall in proportion to the fize of the vifcus. They are connected almoft entirely to each other by means of their veffels alone, in the manner of a bunch of fruit, and have a good deal of motion upon one another. In the other animals they are more preferved in their proper fituation, and in contact with each other by means of their cellular fubftance. No fatisfactory phyfiological reafon has yet been given for the kidnies being divided into numerous diftinct glands in certain animals and not in all. It has been conjectured that this ftructure was in fome way connected with the habit of diving, on account of its being met with in all the aquatic mammalia; but, as we have before ftated, it is not

not peculiar to them. Like many other peculiarities of ſtructure it muſt remain unexplained, until it be inveſtigated by experiment.

The number of papillæ indicate both the original and the actual number of lobes that compoſe the kidney. There is but one papilla in the *tanrec* and the *coati*; in the *ſquirrel*, the *hare*, the *guinea-pig*, the *daman*, and many other of the *ſaltigrada*. There are two in ſome *rats*, three in the *elephant*, four in the *echidna*, and five in the *hedge-hog*. In the *otters*, *bears*, *fin-footed* and *cetaceous* mammalia, each ſeparate lobe has its proper papillæ.

The papillæ regulate in a certain degree the number of infundibula. When there is but one papilla the infundibulum is commonly abſent, being confounded with the cavity called the pelvis of the kidney. This is particularly to be ſeen in the *cat*, the *dog*, the *armadillo*, &c. in which the medullary ſubſtance that forms the papillæ does not project into the cavity, but is flat or ſometimes hollow: therefore, the cavity which receives the urine, and is the origin of the ureter, cannot ſend off any proceſſes or funnel-ſhaped reflections of its membrane. The pelvis of the kidney in theſe caſes is not viſible on the outſide.

The lobulated kidnies have a calyx or infundibulum to each of the glands that compoſe them. They unite to form trunks of veſſels, which make at laſt ſomething like a pelvis for the ureter to ariſe from in the *bears*, *otters*, and *ſeals*. In the *cetacea* there is no pelvis; the ureter is formed by the junction of ſome branches from the anterior infundibula, and receive the branches of the other infundibula afterwards, without forming any dilatation correſponding to the pelvis.

The *renal arteries* and *veins* do not enter at one place always: this is occaſionally ſeen in man. The *adipoſe arteries* alſo are of various ſizes, but in the lobulated kidnies, the veſſels penetrate the organ at the neareſt place, inſtead of paſſing in preference at the ſinus, or the part where the excretory ducts come forth.

The veins of the kidnies in the *cat* kind have their principal trunks and branches running in an arboreſcent form upon the ſurface. They receive the branches from the internal part of the gland, as the ſinuſes of the dura mater collect the blood from the brain.

The intimate ſtructure of the kidnies in all mammalia appears to be the ſame as in the human ſubject.

The chemical compoſition of the urine appears not only to vary conſiderably in animals reſembling each other, but even to differ in the ſame animal at different times. In this way one may account for the diſagreement in the analyſis publiſhed by the French and Engliſh chemiſts.

The urine in the *camel*, according to Mr. Brande's experiments, is compoſed as follows:

Water	75
Phoſphat of lime, Muriat of ammonia, Sulphat of potaſh, Urat of potaſh, Carbonat of potaſh	6
Urea	6
Muriat of potaſh	8
	95

Rouelle ſtates the *camel's* urine to be compoſed of carbonat of potaſh, ſulphat of potaſh, muriat of potaſh, urea, and water.

Mr. Brande found the following component parts in the urine of the *cow*:

Water	65
Phoſphat of lime	3
Muriat of potaſh, ——— ammonia	15
Sulphat of potaſh	6
Carbonat of potaſh, ——— ammonia	4
Urea	4
	97

But from Rouelle's examination, it conſiſts of carbonat of potaſh, ſulphat of potaſh, muriat of potaſh, urea, and benzoic acid. Both theſe chemiſts agree that potaſh is the only fixed alkali in the urine of the *cow*.

The urine of the *rabbit*, according to Vauquelin, is compoſed of the following parts: carbonat of lime, carbonat of magneſia, carbonat of potaſh, ſulphat of potaſh, ſulphat of lime; muriat of potaſh, urea, gelatine, and ſulphur.

The ſame chemiſt found that the urine of the *guinea-pig* depoſited carbonat of lime; that it changed the colour of ſyrup of violets to green; and that it contained carbonat and muriat of potaſh, but not any phoſphat, nor the uric acid.

From theſe examinations it would appear that ſoda and its combinations do not form any part of the urine of the *camel*, *cow*, *guinea pig*, and *rabbit*.

In the urine of the *horſe* the following component parts have been diſcovered by Fourcroy and Vauquelin:

Carbonat of lime	11
——— ſoda	9
Benzoat of ſoda	24
Muriat of potaſh	9
Urea	7
Water and mucilage	940
	1000

Mr. Brande found the urine of the *horſe* to contain the following ſalts, *viz.* carbonat of lime and of ſoda, ſulphat of ſoda, muriat of ſoda, benzoat of ſoda, and phoſphat of lime, which parts amounted to about ⅑th of the urine.

The urine of the *aſs*, according to the ſame chemiſt, is mucilaginous, but at the ſame time tranſparent. Like that of the *horſe*, it changes vegetable blues to green, but depoſits no carbonat of lime. It differs in compoſition from that of the *horſe*, by containing a much greater relative proportion of phoſphat of lime and urea: it alſo contains carbonat, ſulphat, and muriat of ſoda, and there appeared to be a ſmall quantity of potaſh, which is probably united to muriatic acid. He did not diſcover any benzoic acid.

It deſerves to be remarked, that the urine both in the *horſe* and *aſs* is deſtitute of ammonia.

The urine of quadrupeds appears to have generally more conſiſtence than in man. It feels particularly unctuous or mucilaginous in the *horſe*, *aſs*, and *cow*.

Fig. 1. *Plate* VII. of the *Anatomy of Mammalia*, exhibits the lobulated kidney of the *bear*.

The *urinary bladder* exiſts in all mammalia, and reſembles, in general very cloſely, that of the human ſubject. Its muſcular coat is particularly ſtrong in ſome quadrupeds: it is moſt ſtrikingly ſo in the carnivorous ſpecies, and a few herbivorous quadrupeds. The faſciculi of the bladder are,

 in

in these instances, very thick, and generally contract the bladder when the animals die; by which it is supposed to have a smaller cavity than it really possesses during life. In the large graminivorous quadrupeds the muscular coat is generally weak, and hence the great distention that the bladder admits in these animals by inflation.

The bladder of the *echidna* and the *ornithorhynchus* terminates in a long neck or tube, which opens by a small foramen into the cloaca, as in the *tortoise*. The ureters and vasa deferentia open close to each other into this tube, before the bladder. The urine, therefore, must return, or regurgitate into the bladder, in the same manner as in the *tortoise*.

This fact is displayed in *fig.* 5. *Plate* VII. of the *Anatomy of Mammalia*. The letter *g* indicates the tube; *i*, *i*, are the orifices of the ureters before the neck of the bladder; *h* is the opening of the tube into the cloaca; *k* is the urinary bladder.

Renal Capsules.—The French academicians have stated, that these parts are deficient in the *Canada stag*; but this appears to have been a mistake, as no instance of their being wanting in mammalia is mentioned by other writers.

The relative situation of the capsules to the kidnies is nearly the same as in man. Sometimes they adhere to the kidnies, but, almost constantly, the right is attached to the vena cava.

The magnitude of these bodies differs very much according to the species, besides the variations depending upon age, which seem to be less than in man; and in the *guinea-pig* the capsules are even larger in the adult than the fœtus.

The relative bulk of the renal capsules to the kidnies is as great in the *monkey* as in *man*. Cuvier found it to be as 1 to 16 in the *varied ape* (*simia mona*), and as 1 to 12 in the *simia patas*. He found it to be $\frac{1}{3}$d in a *young howling baboon*.

In the *digitigrada*, Cuvier found the renal glands to be $\frac{1}{15}$th the size of the kidnies in the *tiger*, and in the *lynx* the $\frac{1}{2}$th.

They are the $\frac{1}{16}$th in the *hedge-hog*; the $\frac{1}{40}$th in the *kanguroo*; but the other *saltigrada* in general have the renal capsules large. In the *guinea-pig* they are in the proportion to the kidnies of 1 to 5: they appear to be largest in some of the *rat* genus, in which they equal the $\frac{1}{4}$th of the kidnies during the whole life of the animal.

The *opossum* has them only amounting to the $\frac{1}{43}$th of the size of the kidnies.

In the *horse* they are the $\frac{1}{30}$th.

Cuvier found the renal glands smaller in the *seal* than in any of the whole class. This animal has them only the $\frac{1}{13}$th part of the size of the kidnies.

The form of the renal capsules is very various, but corresponds, in some degree, with that of the kidnies; thus, when the latter are lobulated, the capsules are commonly so also.

In the *ruminating* and *solid-footed* quadrupeds, these parts resemble the renal capsules of the human subject, being flat and triangular.

In the *elephant* they are long, conic, and have their base turned backwards, and divided into two round lobes.

In the *paca* and the *porcupine*, they are elongated and cylindric. In these, and a great many mammalia, they resemble very exactly the kidnies. In the *coati* and the *daman*, they have a sinus like the kidnies.

In the *seal* and the *cetacea*, they are flat and triangular, but divided into many lobes, which coalesce in the centre. The lobules are more separate in the *cetacea* than in the *seal*.

The structure of the renal capsules is the most interesting part of their history, but it is involved in some obscurity. The vein which collects the blood of the capsule commonly forms a dilatation in the centre, which seems to have been sometimes mistaken for a peculiar cavity. Cuvier, however, has described three little pouches in the renal gland of the *elephant*, which he found to be covered with a very delicate, smooth, white membrane, that exhibited no orifice of any blood-vessels. This membrane appeared to be moistened with a clear mucous fluid. The bottom of one of the pouches had a little hole, which communicated with a fourth pouch, occupying the internal and posterior lobe of the capsule.

The appearance of two substances composing these glands is generally the same in mammalia as in man. The external or yellow portion of the capsule appears to correspond with the cortical substance of the kidnies. It is of a brighter colour generally in animals than man, and is often so thick as to occupy more than the half of the gland. Cuvier says, that it is composed of fibres or tubes situated in a perpendicular direction with respect to the internal substance. This last is soft, and of a deep brown colour.

In the *coati* three substances have been observed: one grey, which forms the nucleus. It is encompassed by a stripe or thin layer of a brown coloured substance; and external to these there is another thin layer of a bright yellow colour.

The same distinctions of substances exist in the *guinea-pig*, the *rat*, and some other *saltigrade* quadrupeds, or rather a division into five substances, according to J. T. Meckel, who reckons every shade of colour as a distinct substance composing this gland.

It is remarkable that in the *elephant*, which has the cortical and medullary substances of the kidnies indistinct, the two substances of the renal capsules are so likewise, which marks the great analogy and connection which exist between the kidnies and these bodies. This is still further shewn by the renal capsules having an uniform colour and substance in birds, which want the distinction of cortical and medullary substances in their kidnies.

Plate VII. of the *Anatomy of Mammalia*, and *fig.* 2, shews the relative magnitude and form of the renal capsule and kidney in the *common rat*: *a* is the capsule to the kidney. *Fig.* 3, of the same plate, exhibits a section of the renal capsule of the *rat*, in order to expose its different coloured substances: *a* is the central substance; *b*, the intermediate one; *c*, the cortical or external substance. *Fig.* 4. is a section of the renal capsule of the *ox*, to exhibit the cavity in the interior; *a*, the vein of the capsule; *b*, the cavity.

Glands for peculiar Excretions.—The most of these in mammalia are situated in the neighbourhood of the anus, or the external parts of generation, and secrete an odorous fluid, the natural use of which appears to be that of a defence against hostile animals. Nevertheless, many of the products of the excretory glands are employed by mankind as perfumes, or as medicines. There appears to be a very considerable resemblance amongst these excretions of quadrupeds, not only in their colour and consistence, but their effects upon the sensations of other animals. The fœtid matter furnished by the *pole cat*, and the *civet* or *musk*, are equally offensive to many individuals of the human species, and are probably universally disagreeable to beasts, except those that furnish them. All these odorous excretions likewise have a similar effect upon the nervous system, though differing in the degree of that effect.

In several quadrupeds, besides the small follicles which furnish the sebaceous matter of the prepuce, the odour of which is rather calculated to invite the opposite sex than to disgust other animals, there are two glands of considerable

size

fize on the fides of the penis, which are conglomerate and formed of different lobules united together, and producing a common excretory duct, which opens within the prepuce either of the penis or the clitoris. Thefe are very remarkable in the *rat* tribe, in whom they are large, flat, oval maffes of granular bodies.

Cuvier ranks the apparatus which furnifh the *caftor* amongft the *glands* of the prepuce, but they are much larger than would be neceffary for the fecretion of a fubftance to be ufed merely on the penis or clitoris. They are fituated under the integuments, between the pubis and the common aperture of the anus and prepuce, which exifts in the *beaver*. The number of thefe glands is apparently four; but there are two others involved in the lower facs. The two firft glands are conjoined together, and have, when thus united, the figure of a heart. Their internal coat is fmooth, thin, and of an afh colour, ftreaked with fome white lines. They contain a cavity internally, the parietes of which are thick, and formed into irregular folds or wrinkles, upon which a grey odorous fubftance is found to adhere. The afh colour of the external coat is derived from the inner one. Thefe two glands or pouches meafure acrofs about two inches in each direction. Where they are applied to each other, there is an aperture of communication between them of an inch in fize. Both glands difcharge their contents into the prepuce by a fingle orifice.

Underneath thefe facs there are two others, which are diftinct, and have the figure of a pear, fomewhat flattened. They are two inches and a half long, and about ten lines broad. There are placed, between their coats, a number of fmall glandular bodies, each of which contains a cavity, in which there is a fluid fecreted, that is ftrongly odorous, yellow, unctuous, and combuftible.

At the lower part of thefe pear-fhaped pouches the third pair is found. They are about fourteen lines in length, and fix in breadth. They are full of a fluid, which is yellower than the contents of the other glandular facs, and has alfo a different fmell. Thefe pouches have likewife little glandular bodies on their furface, fimilar to thofe of the fecond pouches. The membranes of the two lower pair of pouches are intimately united to each other. Both thefe pair open into the common aperture of the anus and prepuce. An ancient error prevailed with refpect to the *caftor*: many of the old anatomifts believed that it was taken from the tefticles. Some abfurd ftories alfo are told of it; fuch as the *beaver* preffing this fubftance out with its paw, and eating it to create an appetite, &c.

The apparatus for the fecretion of the *mufk* in the *mofchus mofchiferus*, is perfectly fimilar in ftructure to that above defcribed in the *beaver*. The pouch containing the mufk is fituated under the fkin of the abdomen. Its figure is oval, and it is hollowed below into a groove, in which the penis comes forth; its parietes are apparently membranous, but the inner furface prefents many irregular folds. The pouch has a fmall orifice, which is at the fore-part of the prepuce. The membrane furrounding it contains fome febaceous follicles. Between the pouch and the fkin of the belly there is a flefhy fubftance, apparently glandular. The mufk does not exift in the females, nor in the young males.

The *antilope gutturofa* has alfo been defcribed by Pallas as poffeffing a fimilar membranous pouch to the foregoing, but it does not contain the mufk. Moft of the *antilopes* have a pouch at the fide of each nipple, formed by a fold of the fkin, which contains an oily, odorous matter.

The *inguinal* glands of the *hare* appear to belong to the clafs of thofe of the prepuce. They are fmall oval bodies; their orifices are on two femi-lunar fpots of the fkin, which are deprived of hair, and are fituated one on each fide of the prepuce of the penis, or of the clitoris.

Thefe glands, which Cuvier has called the *anal*, are capable of furnifhing the moft powerful of the odorous excretions. They are thefe which afford the fubftance called *civet*, and thofe offenfive difcharges of others of the *weafel tribe*, the effluvium of which fcarcely any animal can bear to approach. Thefe anal glands are two pouches of a round or pear-fhape, the coats of which are glandular. The interior of the facs is lined apparently by the continuation of the fkin. They are the refervoirs of the odorous matter which is difcharged by a large opening from each fac, ufually into a cell or cavity formed by the integuments either around the anus, or in the neighbourhood of it. There are peculiar mufcles for compreffing thefe bags. Bartholinus figured four mufcles; the French academicians found but three; one which paffed acrofs from one pouch to the other, and two mufcles which arofe from the ifchium: each came to be joined to its antagonift at the middle of the two pouches, and was faftened to the pouch over which it went to make this conjunction. Cuvier merely reprefents fome fafciculi, which crofs between and furround the pouches. The odorous matter found in the *civet* bags is of a yellow colour, and refembles oil in compofition and confiftence. It has the fmell of mufk.

Thefe kinds of anal glands are met with in many of the *digitigrade* and *faltigrade* quadrupeds, and *feal* tribe; Blumenbach alfo afcribes them to the *opoffums*. There are three of thefe pouches in the *marmot*, but fmaller than the ufual fize: they open upon the edge of the anus, in the centre of three papillæ which project from the anus when the animal is excited.

In feveral quadrupeds, befides the ftink bags above defcribed, there are numerous fmall glands placed in the parietes of a large cell or cavity, which the integuments form either around the anus or in the neighbourhood of it, or, in rare inftances, in other parts of the body. Thefe frequently make a part of the excretory apparatus already defcribed, but they exift alfo without the anal facs, or ftink bags.

In the *civet*, this cavity is fituated between the genital organs and the anus: it opens by a longitudinal flit, the edges and infide of which are furnifhed with long hairs, that ftand inwards. The inner furface of the cavity is grooved in the tranfverfe direction.

The glandular cavity of the *ichneumon* furrounds the anus: the internal furface of it exhibits a great number of foramina along the margin. Thefe are the orifices of the follicular glands, which are each about the fize of a fmall pea, and lie upon the external part of the parietes of the cavity. They furnifh a thick, yellow, oily fluid. On the fuperior part of the circumference of the anal cavity there is a triple row of little conglomerate glands, which fecrete a whitifh matter, and have larger openings than the preceding glands. This cavity further receives the contents of the large glandular facs above defcribed. The anal cavity is compreffed by the ufual fphincter ani.

The *guinea-pig* has a fquare fhaped cavity below the anus. It is much puckered internally, and receives the product of two febaceous glands, which has a peculiar fmell.

The anal cavity in the *hyæna* has a narrow tranfverfe opening. This flit, fays Cuvier, leads firft to two lateral pouches, which are the central cavities of two glandular maffes compofed of lobes and lobules. Thefe two pouches communicate with two other glands, of which the lobules are more detached, and are even affembled round a central cavity, in which their excretory canals terminate, and which opens

into

into the firft pouches, as we have mentioned. There iffued from the left anterior pouch a yellow-brown matter, although that in the right held a grey matter, as well as the two pofterior pouches.

In the *badger* there is a tranfverfe fiffure between the anus and tail, which is the mouth of a cavity, the parietes of which are furnifhed with a number of fmall glands, that fecrete into it an unctuous fluid. It is this which the *badger* mixes with its urine, and with its tail throws againft its affailants.

The *pecari*, or *Mexican hog*, has a large gland or pouch fituated under the fkin of the back. It is compofed of lobes and lobules, the excretory ducts of which terminate in a fingle orifice in the back. This gland furnifhes an odorous matter, and muft be removed immediately after the animal is killed, it is faid, to prevent the flefh being tainted with the fmell.

There is a gland under the fkin of the temple in the *elephant*, which fecretes a vifcid fœtid matter, and fhould be ranked with thofe juft defcribed, though placed in a different fituation. It has an oval fhape, and is interiorly of a red, fungous ftructure. The fluid it fecretes paffes off by a canal, which defcends obliquely from behind forwards, and opens midway between the eye and the ear. The parietes of the canal refemble the fkin. The fluid of this gland is lefs abundant in females than males ; in the latter it is very copious when the animal is in heat. After death it becomes like wax.

In the *antilopes* and *deers* there is a cell near the inferior and internal part of the eye ; it is covered internally by a continuation of the fkin, and is lodged in an excavation of the fuperior maxillary bone. The parietes of this fac are provided with febaceous follicles which fecrete a thick, black, unctuous fubftance. Thefe facs open by a flit. They have no connection with the lacrymal gland, or the tears, as has been fuppofed, but feem to belong, whatever may be their ufe, to the clafs of glands at prefent under confideration.

The *fheep*, and feveral of the *cloven-hoofed* quadrupeds, have glandular cavities in the feet. Thefe are covered with hair internally, and have an excretory duct, which opens at the junction of the toes. When this is obftructed from wet weather, it occafions difeafe in the fheep.

In *fig.* 6. *Plate* VII. of the *Anatomy of Mammalia*, there is a view of the three different kinds of anal glands in the *ichneumon*. The letters *o* and *p* indicate the pyriform facs ; *q*, *q*, are the fmall glands which are upon the outfide of the two-thirds of the cavity that furrounds the anus: thefe furnifh the yellow unctuous fluid: *r*, *r*, are the conglomerate glands, fituated farther in upon the anal cavity, and which fecrete the whitifh matter. Some mufcular fafciculi are feen to pafs between and furround the anal glands *o* and *p*, by which their cavities are compreffed, and their contents forced into the common cavity that includes the anus, and receives the fecretions of the three orders of anal glands in this animal.

Organs employed in the Exercife of the Generative Functions.

Male Parts of Generation.—The *penis* is a more complex organ in many mammalia than in man. The peculiarities in its formation do not correfpond with a fimilarity of general ftructure in different animals, but are often perfectly fpecific, which feems to be defigned, in fome meafure, to prevent that promifcuous intercourfe which the blind appetites of fome animals might lead to.

The penis has its figure and magnitude in many cafes determined by the prefence of a bone in it. The *os penis*, by giving firmnefs and fhape to the member, renders the corpora cavernofa and the glans lefs neceffary : we accordingly find thefe parts diminifhed in thofe fpecies which poffefs a bone in the penis.

The os penis has been found in fome fpecies of *monkey*, but not in others : in moft of the *bat kind*, in the *bear*, the *badger*, the *racoon*, the *weafel*, the *ichneumon*, the *otter*, the *dog kind*, except the *hyæna*, the *cat kind*, the *hamfter*, and feveral of the genus *mus*, the *feal*, the true *whales* amongft the *cetacea*. It is denied to the *lamantins* by Cuvier, but Blumembach ftates that it exifts in the *walrus*. We poffefs a preparation of an os penis, which we have every reafon to fuppofe belonged to that animal. It is two feet long, thicker than the thigh-bone of a man, and as folid as ivory, except at the root and where the glans is attached, at which places it is fomewhat fpongy in its texture. Camper is faid to have a preparation of this bone, which had been fractured, as he fuppofed, during coition, for the penis of this animal is not expofed to injury unlefs when erected.

The os penis is grooved in the lower furface for holding the urethra in the *dog* kind. It ends in a hook in the *weafels*. It is curved into the form of an S in the *racoon*. In the *fquirrel*, it is fpirally twifted at the extremity. It is large, rounded, and terminates like a club in the *whales*.

This bone forms the principal part of the penis in the *bear*, *otter*, *racoon*, *badger*, *dog*, and *weafel*; but in the *bats*, *cat*, *ichneumon*, and moft of the *rat* kind, it is fmall, and ferves as an acceffory part to the corpora cavernofa.

The direction and attachment of the penis are different from what is obferved in man ; none bu the *quadrumana*, the *cheiroptera*, and the *armadillos*, have the penis pendulous, or at all times projecting from the body, and covered with a fkin proper to itfelf. In the other genera, the penis, when employed, is concealed more or lefs in a fheath formed by the fkin of the abdomen. In the *carnivorous* and the *large herbivorous quadrupeds*, the fheath of the penis opens forwards, near the umbilicus. When the penis is long in thefe cafes, it forms curves or folds upon itfelf in the fheath. According to Cuvier, the penis of the *elephant* makes, when retracted within the fheath, the curves of a double italic *S*.

Thofe quadrupeds which have the penis fixed in this manner under the belly, have two *adductor* mufcles to the fheath : they arife from below the aponeurofis and the flefh of the abdominal mufcles by feveral fafciculi, and having joined their fafciculi, are inferted into the fides of the anterior part of the fheath. Thefe draw the fheath forwards upon the belly. There are alfo two mufcles for *retracting* or opening the fheath, which come from the firft caudal vertebræ : they terminate in the *digitigrada*, either upon the external part of the corpora cavernofa, or upon the os penis ; and in the *ruminants* they are inferted upon the fheath of the penis. In the former thefe mufcles muft bring back the penis itfelf.

In the *folipeda*, the retractor mufcles accompany the inferior part of the urethra, and are loft in fafciculi that are diftributed upon the mufcle which covers this canal. In thefe animals Cuvier thinks the retractor mufcles reftrain the elongation of the penis when it is erected, and contribute to withdraw it into the fheath.

Thefe mufcles appear to be fupplied in the *elephant* by the levators of the penis, to be defcribed hereafter.

In fome of the *faltigrade* quadrupeds, the penis comes firft as far forwards as the anterior brim of the pubes, and then turns back, the orifice of the prepuce being near the anus. But in moft of the *faltigrada*, and in the *opoffums*, the

the penis goes backwards from the time that it comes out of the pelvis.

Several quadrupeds have been obferved to void their urine backwards. It was, therefore, thought by the ancient naturalifts, that they alfo copulated in the fame direction, but later obfervations have proved the contrary.

The figure of the penis is very various in mammmalia. It is determined either by the fize and fhape of the os penis, when that bone exifts, or by the form of the glans, and the thicknefs of the corpora cavernofa. The penis is flender in the *boar* and *cloven footed* quadrupeds. It is thick and long in the *folipeda*, the *elephant*, and the *lamantins*; thick and conic in the *porpoife* and *rhinoceros*; thick, conic, and flat in the *dolphin*; nearly cylindric in the *monkies* and *lemurs*; fhort in the *opoffum*, and moft of the *faltigrada*, the *digitigrada* and the *feal*; long and cylindric in the *hedge-hog*; twifted like a fcrew in the *fquirrel*, and bent like an S in the *racoon*.

The corpora cavernofa are commonly formed of two diftinct branches arifing from the ifchium, as in man, and afterwards joined apparently into one body; but the interior divifion of this part of the penis by a feptum is often lefs diftinct in mammalia, and fometimes is wanting. It is incomplete in fome fpecies of *monkey* and in the *lemurs*. It is totally wanting in the *bear* and the *badger*. It is alfo abfent in moft of the *many-hoofed* quadrupeds: the *elephant* and *rhinoceros*, however, have it. The *folid* and *cloven-hoofed* quadrupeds and the *cetacea* want a feptum between the corpora cavernofa. In thefe cafes the ligamentous laminæ arife from within the circumference of the united cavernous bodies, and meet in the centre.

The corpora cavernofa in the *opoffums* arife by two long fmall branches, which are only connected to the ifchium by means of the mufcles called the *erectores penis*. They unite without any feptum, and then branch into two, in order to form the bifid penis of thefe animals.

In the *kanguroo* there are at firft four corpora cavernofa, which unite to form a conical-fhaped penis. The urethra runs in their centre. They are compreffed by a mufcular inveftment. The director mufcles of the penis, or *ifchio-cavernofi*, ferve to connect two of the roots of the corpora cavernofa to the ifchium. The two other roots are enveloped by a mufcle which takes the place of the *accelerator urinæ*, or *bulbo-cavernofus*.

The interior of the corpora cavernofa, during the erection of the penis, has been defcribed by Cuvier in the *elephant*, and other large quadrupeds, as being compofed of the branches of the veins anaftomofing frequently with each other, fo as to form a clofe and inextricable plexus, refembling cells. We have difcovered the fpongy part of the urethra to be compofed of ramified veffels in man and quadrupeds, but we have not been able to fatisfy ourfelves, that the corpora cavernofa are made in the fame way.

The firft membranous portion of the urethra is in proportion to the reft of the canal, commonly longer in mammalia than in man. The *monkey* kind have it fhort and almoft entirely enveloped in the proftate gland: it is particularly long in the *hedge-hog*, *opoffum*, *kanguroo*, *civet*, and the *cat kind*, in moft of which it is more than half the entire length of the urethra.

The part called *verumontanum*, on which the feminal ducts terminate, contains in the *elephant* and fome others a deep cell. There are frequently other folds of the membrane which form longitudinal eminences befides the verumontanum; and in the *marmots* there are twelve prominent folds, which go off on each fide of the longitudinal projection.

The fecond portion of the urethra in the *cloven-footed* quadrupeds and the *hog*, has a cul-de-fac at its origin, or at that part correfponding to the bulb. This cæcum receives the femen and the fluid of Cowper's glands. In the *fquirrel* and *marmot*, the dilatation in the bulb merely receives the ducts of Cowper's glands, and is continued into a narrow canal, which opens into the urethra as far forward as the middle penis.

The fpongy texture of the urethra in the *opoffum* and *phafcolomys*, all the *marfupial* quadrupeds, and in the *water rat*, arifes in two branches diftinct from each other, and inclofed in their proper mufcle. There is alfo fome appearance of two branches to the bulb in the *camel*.

There is a large corpus fpongiofum in the *large herbivorous* quadrupeds, and a fmall one in the *carnivorous*, more particularly the *otter*, *bear*, &c. It is fcarcely apparent at the part of the urethra which runs along the os penis.

The corpus fpongiofum, as already mentioned, is compofed of an intricate plexus of veins. This is very evident where it forms the glans penis of the *horfe*, in which the veffels are very plainly feen. They likewife communicate with a vaft mafs of veins upon the dorfum of the penis in this animal, which increafe the bulk of this member very much when they are diftended with blood during erection.

The *glans penis* varies very much in mammalia, both with refpect to form and the nature of its integuments: even the animals of the fame genus do not agree in thefe refpects.

The glans of fome *monkies*, as thofe with prehenfile tails, forms a large tubercle, like the head of a mufhroom. In the *baboons* and *apes* it is oval, and fplit into two tubercles at the end where the urethra opens. In the *Chinefe ape* there are feveral tubercles, which produce a fingularly formed glans.

In the *ring-tailed maucaco*, (*lemur catta*), the glans is thick behind, but merely covers the os penis at the end. It is covered with horny fpines, which have their points turned backwards.

The *vefpertilio ferotinus* has two tubercles or bulbs upon the fides of the glans. The inferior furface forms a fort of edge, and is clothed with ftiff hair-like proceffes.

The *hedge-hog* has a piece of cartilage upon the top of the glans.

In the *racoon* the os penis has two tubercles at the end, which give the fame form to the glans.

In the *cat kind* the glans is conic. The point is made by the os penis which projects beyond the orifice of the urethra. In moft of this genus, the glans is armed with reflected fharp hard fpines. Cuvier fays they are few in the *lion*, and moft numerous in the *Mexican cat* (*felis pardalis*).

In all the long-bodied or *vermiform* quadrupeds, and in the *badger*, *bear*, and *racoon*, the glans takes the form of the os penis.

In the *dog* genus, the back of the glans forms a very remarkable bulb of the fhape of a chefnut, the bafe of which is pofterior. It is compofed of venous cells, which are only diftended when the penis is erected, and is compreffed behind the glans, there being two large trunks of veins running backwards, which carry off the blood from the bulb. It is by means of this apparatus that the penis of the *dog* is retained in the female organs, feemingly againft his will. The fphincter of the vagina fuffers a fpafmodic contraction, and compreffes the veins behind the bulb, and thus maintains it in a ftate of diftention. To obviate the effects of compreffion upon the urethra, that part of the canal is lodged in a groove of the os penis. The femen of the dog paffes in jets for fome time after he has turned off, as it has been fuppofed, in confequence of his wanting veficulæ feminales.

In the *opoffum kind*, the glans is neceffarily bifid, as the corpora

corpora cavernosa are so which it covers. The two branches of the glans penis are short, and are directed outwards in the *Virginian opossum*, but in the *Mexican opossum* and the *marmose* (*didelphis murina*), they are long, and grooved upon the inner side so as to form a perfect canal when they are applied to each other. This canal forms a continuation to the urethra.

The *phascolomys* has the glans penis forming four lobes at the end: the urethra opens in the centre.

The *kanguroo* has a long, taper, sharp-pointed glans, formed chiefly by the corpora cavernosa. The urethra emerges near the end of the penis from the united corpora cavernosa, acquires the spongy coat, and ends in a kind of sac, which has its orifice under the point of the glans.

The formation of the glans, as well as all the other parts of generation, is singular in the *saltigrade* mammalia.

In the *guinea pig* the orifice of the urethra is under a flat os penis; and behind and below it there is a cell, in the bottom of which are attached by their base two long hooks of a horny substance: the glans and surface of this pouch are covered with hard scales. When the penis is erected, the pouch is turned inside out, carrying with it the horny hooks, and forming a projection preceding considerably the orifice of the urethra. The glans is drawn in again by two fasciculi of muscles, which arise from the two crura of the corpora cavernosa, and pass under the bulb of the urethra, to which they are also attached. They furnish two tendons that run along the under part of the penis, and are inserted on the outside of the sac or pouch already mentioned.

The glans of the *agouti* is still more curious. It has a pouch similar to that above described, and horny scales upon the surface; and in addition to these, two horny plates upon its sides, which adhere to the glans by one edge, and have the other edge notched like a saw.

The *alpine marmot* has the glans conical, and ending in a fine point, which is formed by the os penis. The urethra opens on the right side of this point, and on the left there is a small deep cell.

In the *common rat* there is the appearance of a second prepuce at the end of the glans, when the penis is not erected: this is produced by the edge of a cavity that encloses the os penis. This bone comes forth by pressure, and exhibits upon each side two little cartilaginous appendices, in the form of wings. The urethra opens under this extremity, and has upon the inferior edge a valve formed like a gutter.

The other species of the genus *mus* have the glans constructed upon the same plan: its surface is armed with papillæ, or with fine hairs, as in the *hamster*.

The *dormice* have a conical and sharp-pointed glans: the urethra opens at the end. There are two cells at its base.

In the *elephant* the glans is at first cylindric, as the rest of the penis: the lips of the orifice of the urethra open to each side.

The glans of the *rhinoceros* has a singular conformation: it is dilated at the end like the mouth of a bell, in the centre of which there arises a peduncle, shaped like a mushroom, with a broad, flat, oval surface, upon the inferior edge of which the urethra opens.

In the *boar*, and many of the *ruminating* quadrupeds, the glans is taper and pointed, and has a fissure upon its side, in which the urethra terminates. The *ram* has it oval, with a transverse fissure at the end. The orifice of the urethra is at the left side of the slit, and near it there is a long slender process of a tendinous substance. The glans of the *camels*, which is long and taper, ends in a hard appendix, which is bent transversely from left to right, by which its edge is turned forwards, and the point to one side.

The *solipeda* have a cylindric glans, which contains a cavity or large cell, that is found to have a quantity of a brown oily substance, for defending the glans from the irritation of the urine, and lubricating the end of the penis. This secretion appears to be similar to that of the glands surrounding the glans in other animals, but is in greater quantity in the *horse* than in them. There is a second cell, according to Mr. Clarke's description, which is smaller than the first, and separated from it by a membranous partition: it nearly surrounds the urethra, which opens at the end of a pyramidal eminence of the glans.

The *northern lamantin* has the glans and all the penis similar to that of the *horse*, according to Cuvier, except the existence of a bone; although he denies that the *lamantins* have an os penis in another place.

The glans of the *porpoise* is broad at the base, diminishes suddenly, and ends in a slender point, at which place the urethra opens. In the *dolphin* it is broad, conic, and flat. The canal of the urethra runs distinctly along its under surface, and opens at its extremity.

The *muscles of the penis* are commonly more numerous in mammalia than the human subject.

The *erectores penis*, or, as they are more properly called by Cuvier, *ischio-cavernosi*, do not materially differ from those of man, except in the *marsupial* quadrupeds: they, however, vary with respect to strength. Cuvier has observed them to be particularly thick in the *lion*; they are weak in the *horse*; and are divided in the *elephant* into four distinct slips. In the *opossum* tribe these muscles form an oval mass around the roots of the corpora cavernosa, which in these animals are not attached immediately to the bones of the pelvis. The bulbous enlargement of the muscles is made of several layers of concentric fibres, which surround and compress the long roots of the cavernous bodies. The origin of the muscles is from the ischium by tendon.

The *accelerator urinæ* (*bulbo-cavernosus* of Cuvier) varies generally in thickness, in proportion to the difficulty of ejecting the urine and semen, as depending upon the structure of the urethra. In the *horse* this muscle is not confined to the bulb, but forms a layer of transverse fibres, which cover the urethra the whole way to the glans.

The *bulbo-cavernosus* consists of two portions in the *rats*, all the *marsupial* animals, the *elephant*, and the *camel*. In the two first tribes, these cover the branches of the bulb, and also extend to the corpora cavernosa and pelvis: they are, therefore, not strictly muscles of the urethra in these animals. The bulb of the urethra is single in the *elephant* and *camel*, notwithstanding its muscle is double.

The *bulbo-cavernosus*, in some instances, has no effect upon the urethra; the contents of that canal being expelled by a strong layer of muscle that surrounds the first portion of the urethra. Thus in the *marmot* and *squirrel*, the *bulbo-cavernosus* compresses the cul-de-sac of the urethra, into which the fluid of Cowper's glands is poured; and in the *ichneumon*, this muscle constitutes rather a thin layer, which surrounds both the glandulæ Cowperi, and performs no other office than that of expressing the fluid from these bodies.

Many mammalia have a muscle for raising and sustaining the weight of the penis. It has been described in the *baboons* as composed of two thick fleshy portions, arising from the arch of the pubis: its tendon is extended along the back of the penis; and towards the extremity it becomes incorporated with the corpora cavernosa. In the *hare*, *marmot*, *cavy*, &c. it is twisted backwards, in order to give the

the proper direction to the penis during coition. This muscle is remarkably large in the *elephant:* it is attached to the pubis by two distinct fleshy portions, and partly to the roots of the corpora cavernosa; they proceed upon the dorsum of the penis, and their tendons uniting into one, it runs in a strong ligamentous sheath to the end of the penis. There is no muscle of this kind in the *horse*, which is the reason that manual assistance is given to that animal in coition.

In the *bear*, *racoon*, the *dog*, &c. there is a small muscle arising from each of the roots of the corpora cavernosa, and conjoined by a middle tendon, which is inserted into the back of the penis under the pubis. This muscle compresses the dorsal vein in the *simia callitrix*, in which animal the middle tendon is not found.

In the *bisulca* there is a muscle on each side, which arises from the tuberosity of the ischium, and ascends obliquely inwards, and is inserted into the bulbous part of the urethra. It brings the bulb downwards and forwards, and contributes as Cuvier thinks, to elongate the penis.

The *arteries* and *veins* of the *penis* are similar in mammalia and man, except where there are plexuses formed, as already described.

The *nerves* of this member are stated by Cuvier to be very large. He discovered that they formed in the *elephant* a net-work upon the veins of the back of the penis, in the same manner as they have been observed to do on arteries.

The *ornithorhynchus* and *echidna* seem to form a link between mammalia, birds, and reptiles, with respect to their anatomy. Their alliance with the two last mentioned classes is decidedly shewn in the structure of the organs of generation.

These two animals have a spur upon the heel of the male, for the purpose of holding the female during copulation. The spur contains two small bones or phalanges: one is very short, flattened, and joined to the astragalus; the other is long and pointed, and serves as the mould of the horny spur, in a manner similar to the spurs of *cocks*. There is no other instance in mammalia of the male possessing any prehensile organ, exclusively designed to be employed during coition.

The *penis* of the *ornithorhynchus* and *echidna* is attached to the margin of the cloaca, as in birds and reptiles. It is covered with the continuation of the lining of the cloaca, and is composed interiorly of a plexus of blood-vessels, which become more close and intricate towards the extremity of the penis. This plexus makes up the whole bulk of the organ: it is only surrounded by a fibrous sheath, and the integuments already mentioned. There is no urethra in the penis of these animals; that canal terminating short of it, as will be presently shewn. The penis is nearly cylindric in its form, and short: it terminates in the *echidna*, in four eminences or processes, which are hollowed out in the centre, like cups. These correspond to the glans of other mammalia, and no doubt are endowed with a greater sensibility than the rest of the organ. Cuvier thinks the concavities of these eminences or papillæ are unfolded during erection. In the *ornithorhynchus paradoxus* the penis terminates in two papillæ, which have denticulated edges; and the surface of the penis is more rough and wrinkled than in the *echidna*.

The erection of the penis in these animals is accomplished by the distension of the vascular structure of the interior part of the organ, and by the contraction of the sphincter muscle of the cloaca. The penis is retracted by a particular muscle, which arises from the *sphincter* ani, and passes along the under surface of the penis, and is attached to its extremity. When retracted, it is received into a sac.

The urethra in these animals is simply a muscular canal, continued from the bladder to the under part of the cloaca, into which there is a small round hole, not quite at the extremity of the urethra; that canal terminating in a sort of cul-de-sac. The *vasa deferentia* open into this canal at the neck of the bladder. There is a layer of muscular fibres arranged obliquely, and meeting upon a middle line, like the constrictors of the pharynx, which encompasses the rectum and urethra together, and assists the muscular coat of the urethra in ejecting the semen and urine into the cloaca.

There are two small oval bodies, containing each a cavity, from which there departs a long excretory duct to the side of the cloaca when it opens. These *glands* appear to correspond to *Cowper's*.

The margin of the anus is furnished with a row of well marked *follicular glands*, similar to those described in *birds*.

The *testicles* are originally formed and situated in the lumbar region, next the kidnies, in all mammalia, and in man. In some of the former they remain in that situation during life, as instances of which we may mention the *ornithorhynchus*, the *echidna*, the *elephant*, the *daman*, the *nectopodous* or *seal* tribe, and the *cetacea*. These animals are consequently without a *scrotum* and *cremaster* muscles. The testicles are retained in their proper situation by peritoneum, in the same manner as the other abdominal muscles.

In a number of mammalia the *testicles* leave the loins, and are placed behind the opening of the abdominal ring, which is so large that these bodies can easily pass backwards and forwards through it, as occasion may require. The testicles have been observed to come out of the abdomen in this manner, particularly in the season for pairing, in the *bat*, *mole*, *shrew*, *hedge-hog*; in many of the *murine* tribe, as the common *rats*, *hamster*, *musk rat*; and in the *guinea-pig*, *porcupine*, *beaver*, *squirrel*, &c. In these animals the passage from the abdominal cavity to the tunica vaginalis is permanently open, and of great width.

The situation of the testicles is subject to vary in mammalia, when they are on the outside of the abdomen: thus they are suspended in a single bag or *scrotum*, behind the penis, in the *quadrumana*, the *digitigrada*, and many *plantigrada*. The *scrotum* is long, and suspended before the pelvis, and wants the *septum scroti*, in the *opossum* kind, the *kanguroo*, and *phascolomys*. The scrotum forms two distinct pendulous bags in the *hare*, *jerboa*, and most of the *cloven-footed* and in the *solid-hoofed* quadrupeds.

The figure of the testicles varies but in a few species from that observed in man. The *racoon*, *badger*, and *elephant*, have these glands of a globular form; and in the *nectopodous* and *cetaceous* tribes they are very much elongated.

The magnitude of the testicles is remarkably great in the *mole* and in the *saltigrade* quadrupeds, being even more considerable than that of the kidnies. In these, and in several other quadrupeds, the testicles become much larger at the season for procreation than they are at other periods.

The interior structure of the testes in man and *mammalia* is essentially the same. In most of the latter that have been examined, the *tubuli seminiferi* are in separate packets. In the greater number of the *saltigrada*, however, they are distinct from each other, and are very large. In the *ram*, the seminiferous tubes have been observed to be very distinct, and to have a serpentine or undulating course.

In several quadrupeds the real structure is clearly seen of the part called *corpus Highmori*. It is not a canal, nor does it it poffefs the ftructure defcribed by the older anatomifts; but is formed by the *tunica albuginea*, and paffes like a ligamentous ftripe or band along the tefticle, from which the laminæ or fibres that pafs downwards and feparate the seminiferous tubes of this gland arife. The principal arteries alfo of the tefticle are fuftained by this band.

The *epididymis* is very large in the *faltigrada* and the *echidna*; in moft of the former and in the *opoffum* tribe, it is not attached along the back of the tefticle, but is free, except at its origin.

The *vafa deferentia* have thinner parietes in thofe animals that retain the tefticles always in the abdomen, than in thofe inftances where they occafionally pafs into the fcrotum, or are always outfide the belly. They likewife proceed lefs directly to their termination in the urinary paffage; thus in the *elephant*, the *echidna*, the *daman*, and the *ant-eaters*, their courfe is very tortuous.

Very frequently the vafa deferentia become thicker, or are dilated before their termination. In the *otter* and *feal*, and in many of the *faltigrada*, as the *hare*, *cavy*, *beaver*, *hamfter*, and the *rat* tribe, thefe tubes acquire ftrength, and in the *faltigrada* juft mentioned, they are alfo wider as they pafs behind the bladder. In the *bear*, *badger*, and *racoon*, their coats are much thicker, and the two vafa deferentia touch each other, and appear as one canal, but do not really communicate. In the *elephant*, the *vafa deferentia*, where they pafs befide the veficulæ feminales, are dilated into globular facs, the furfaces of which adhere to each other. The vafa deferentia of the *horfe* are dilated to about the fize of the human thumb, for five or fix inches before their termination. This dilated part confifts of a number of cells, refembling thofe of the corpora cavernofa of the penis, which, when preffed, pour out a milky fluid. Mr. Bracy Clarke ftates, that the vafa deferentia run in the centre of thefe cells, with each of which they communicate by fmall pores. See ANATOMY *of the Horfe* in this dictionary.

There is a fimilar dilatation in the vafa deferentia of the *ram*, in which there are tranfverfe laminæ that form a mefh work.

The vafa deferentia are ftill more dilated in the *buffalo* than in the *ram* or *horfe*. They are not divided into cells or mefhes, but there are little cavities that fecrete a fluid. They are dilated alfo in the other *ruminants*. The defign of this ftructure feems to be to add a peculiar fecretion to the femen before it paffes into the urethra.

Cuvier mentions a curious variety in the courfe of the vas deferens, from the fcrotum into the pelvis, in the *Chinefe monkey* (*fimia finenfis.*) In this animal, that canal does not pafs through the abdominal ring, but through the crural arch, and afcends between the internal and external oblique mufcles to join the *cremafter* mufcle near the ring.

In a very few inftances, the two *vafa deferentia* have but one opening into the urethra. In the *badger* they terminate in a cul-de-fac, which contains the verumontanum.

The *veficulæ feminales* are wanting in the following mammalia, *viz.* in all the *plantigrada*, except the *coatis* and the *hedge hogs*; in all the *digitigrada*; the genus *didelphis*, the *ornithorhynchus*, and *echidna*; the *cloven-hoofed* quadrupeds; in the *feal* tribe, and the *cetacea*.

The veficulæ feminales are nearly fimilar in the *monkey* and the human fubject.

In the *vampyre bat* they are large, and form three convolutions. The firft third of their canal is without cells or reticulation, and opens into a round body which is fituated upon the neck of the bladder, and has the interior divided by membranous laminæ into a great number of cells, which are found filled with a feminal fluid. This cellular refervoir alfo receives the vafa deferentia, and has two fmall openings into the urethra. The remainder of the tube of the veficulæ is cellular, as ufual.

In the *common bats* they are round white facs, with a fimple cavity: their coats are glandu'ar.

In the *hedge-hog*, the veficulæ appear as bundles of convoluted tubes; ufually four in number on each fide of that part of the urethra which contains the verumontanum: each of thefe bundles of tubes ends in one tube, which either opens feparately, or conjointly, with that of fome of the other bundles or parcels in the verumontanum. Thefe different bundles or veficulæ, when taken together, exceed in bulk that of the two tefticles of the *hedge-hog*.

The veficulæ of the *guinea-pig* are two long conical tubes, becoming much thinner towards the extremity: they have fome dilatations in their fecond half.

In the *agouti* they are alfo large tubes, and have fome fmaller branches.

In the *marmot of the alps* the veficulæ are fmall; their cavity is very intricate, and their coats glandular. They are fimilarly formed in the *bobac*, according to Pallas; but he defcribes the veficulæ of the *fuflic* (*mus citellus*, Pall.) as being compofed of a little puckered tube, which adheres to a mafs formed of fmaller tubes.

The *rat* tribe have the veficulæ feminales enormoufly large, particularly during the feafon of procreation. They project even beyond the pelvis. They are membranous bladders, conical in their figure, but twifted, and having their cavity rendered unequal by dilatations on their convex edge.

The *common hare* and *rabbit* have one fac in place of the veficulæ feminales. This is of a confiderable fize, and of a rectangular figure. The external corners are fometimes extended from the body of the fac, and reprefent the two veficulæ. The coats of the fac are membranous, except in the two-thirds of their fuperior fide, which are very thick and glandular, and fimilar to the fubftance of the proftate gland. The opening of this fac into the urethra is fingle. In the *lepus pufillus*, *ogotona*, and *alpinus* of Pallas, the veficulæ are two, and feparate, as in other animals.

In the *fquirrel* the veficulæ are fmall, wrinkled, convoluted tubes, with glandular coats.

In the *daman*, according to Cuvier, the veficulæ are very large and ramified.

The *rhinoceros* has the veficulæ making two tolerably large bladders: their cavity is irregular, from a number of dilatations on their external fide.

In the *boar*, the veficulæ are remarkably large, and compofed of lobes and lobules which contain cells interiorly, that communicate with each other. All the lobes pour out their contents through a common canal, which opens in the verumontanum.

The veficulæ feminales of the *elephant* are very large. Their figure is nearly oval, there being a contraction which feparates the top from the reft of the fac. The internal furface of the top and middle portions is provided with irregular columns or projections of the internal membrane of the veficulæ, which is much thicker towards the top or end of the facs than elfewhere. The veficulæ are furnifhed with a mufcle for expreffing their contents in this animal. It arifes from the neck, and extends as far as the middle part of the fac, its fibres fpreading as they proceed.

In the *horfe* and *afs*, the veficulæ are two long membranous bladders, like portions of an inteftine. They are wider at the end or fundus than the neck, which ends in a large excretory canal, that opens into the urethra by a common orifice with the vas deferens.

Some anatomifts have fuppofed that the proftate glands of the *cloven-footed quadrupeds* were the veficulæ feminales. The only part correfponding to the veficulæ in thefe animals, is a ligamentous bridge extending between the ends of the two vafa deferentia, and ferving to unite the bafes of the proftate glands. This ligament has been obferved in the *ram*, the *axis*, &c. But in the *fallow deer*, the place of the ligament is taken by two little capfules, which appear to be glandular, and their cavity to lead to the verumontanum, by the fame orifices with the vafa deferentia.

The parts fupplying the place of the *proftate gland*, are very different in their ftructure and number in different genera of mammalia. The termination of the proftatic duct or ducts alfo is various; they are found to open into the origin of the urethra, or throughout its extent, or towards the end of that canal. In fome of the *faltigrada*, in the *hedge-hog*, and in the *mole*, the parts correfponding to the *proftate* glands are defcribed by Cuvier as a diftinct feries of glands, which he, calls *veficules acceffoires*, on account of their having a ftructure fimilar to that of the veficulæ feminales, and becaufe they are obferved to enlarge during the feafon of procreation; but their being found in thofe animals which have not proftate glands of the ufual ftructure, and yet are remarkable for the magnitude of all the genital organs, would lead us to receive thefe veficular bodies as analogous to the proftate glands of other mammalia; we fhall therefore defcribe them as fuch in the proper order of the animals to which they belong.

The proftate gland in the *monkey* tribe is fimilar to that of the human fubject, except that it is fomewhat different in fhape. In the *mandril*, there are fome additional lobes to the proftate.

This gland in the *lemurs* has two offsets, which furround the excretory ducts of the veficulæ feminales. There are two in the *lemur tarfius*, which form diftinct tubercles before the veficulæ upon the fides of the urethra.

In the *vampyre bat*, the proftate is fimple, as in *man* and the *monkey*; but in the *common bats*, this gland confifts of a great number of lobules.

In the *bear*, the fubftance of the proftate appears to be confounded with the enlargement of the united vafa deferentia.

In moft of the *vermiform quadrupeds*, as they are called, fuch as the *weafel*, and in the *otter*, this gland appears like a layer upon the urethra. In the *ichneumon*, however, it is of a confiderable fize.

The *hedge-hog*, as before obferved, is one of the animals which has the proftate formed of a number of tubes. It has four bundles of thefe tubes, which are fmaller than thofe of the veficulæ feminales, and arranged parallel to each other, branching into ftill fmaller tubes

In the *mole*, this gland is alfo compofed of a mafs of tubes, ramified and convoluted upon each other. During the feafon for copulation, thefe tubes enlarge fo much, that they form a bundle, according to Cuvier, of a greater bulk than the urinary bladder.

In the *agouti* and *guinea-pig*, the proftate is formed of ramified and convoluted tubes. The former animal has thefe tubes ending in veficular proceffes.

The *rat tribe* and *lagomys* have alfo tubular proftates, and in addition to them have two glands, which are attached to the inner furface of the veficulæ feminales. They are compofed chiefly of one tube.

In the other *faltigrada*, the proftate gland is a fingle mafs, often divided pofteriorly into two lobes.

The proftate is fingle alfo in the *digitigrade* and *pedimanous* quadrupeds, as far as they have been examined.

In the *boar*, it is divided into lobes, and there is befides a layer of glandular fubftance, which furrounds the origin of the urethra.

The *elephant* has four proftate glands, which are fmall in proportion to the other parts of generation. They are of different fizes with refpect to each other. Some mufcular fibres are fpread over them which ferve to prefs out their fecretion. Each gland contains one principal cavity, with which fmaller cavities communicate: thefe laft fill the indiftinct lobes that are feen upon the glands externally. The chief cavity of each gland produces a duct, and thefe ducts terminate feparately at the fide of the verumontanum.

The *cloven-hoofed quadrupeds* have two proftates poffeffing the fame cellular ftructure as thofe of the *elephant*. The lobes are ftill more diftinct in the *ram* and *bull*.

There are four proftate glands in the *folid-hoofed* order. The two firft are paler, and have larger cavities than the others. They are covered with mufcular and tendinous fibres, which are extended to them from the veficulæ feminales and the bladder. The ducts from this pair of glands have many orifices in the urethra. The fecond pair of proftates are fituated towards the end of the membranous portion of the urethra. They are enclofed by mufcular and tendinous fibres. They have each twelve ducts, which open by as many orifices, arranged in a row in the urethra.

The *feal* tribe have the fame fort of proftate as that defcribed in the *otter*.

The *cetacea* have the proftate in a fingle mafs, and cellular internally, as in the human fubject, &c. The mufcle which furrounds it is very ftrong.

The *glands* called *Cowper's* are much larger, and confequently of more importance, generally, in mammalia than in man. They are wanting in fome genera, and prefent in others clofely allied to them. Thefe glands, therefore, as well as the veficulæ feminales and proftate, are not fubject to any general rule, or regulated, either as to their exiftence or magnitude, by the anatomical rank or character of the animals. Cowper's glands are not found in the *bear*, *racoon*, *hedge-hog*, *mole*; and are wanting, according to Cuvier, in all the *plantigrade*, except the *ichneumon*; in the *dog* genus; the *vermiform* quadrupeds; in the *hare* and *rabbit*; in many other of the *cloven hoofed* tribe; the *horfe* and *afs*; in the *feal*, and in the *whale* tribe.

Thefe glands become larger than in man, in proportion to the fize of the animals, in the *quadrumanous* and *chieropterous* mammalia.

They are alfo very large in the *civet* and *cat*; of a ftill greater fize in the *hyæna*. The mufcle that furrounds them in thefe animals is very thick.

In the *ichneumon*, the glands of Cowper are very remarkable. They are covered by a layer of mufcle, and each of them is befides inclofed in a mufculo-tendinous fac. Each gland confifts of a number of veficles, which communicate with each other, and furnifh a fingle excretory duct, that runs along the lower part of the urethra, and terminates by a diftinct opening in the bottom of the cell at the end of the penis, in which alfo the urethra itfelf finifhes. Thefe glands have an egg fhape, and are of great fize.

In the *marfupial* animals there are feveral Cowper's glands, and it is remarkable that they are never wanting in this tribe, although the other glands are in fome of the genera. The *Mexican* and *Surinam opoffums* (*didelphis cayopollin*, *d. orientalis*), the *phafcolomys*, and the *great kanguroo*, have fix Cowper's glands. The *kanguroo rat*, and *Virginian opoffum*, have four. In all thefe animals they are compofed of tubes which lie in the longitudinal direction of the glands.

In the *echidna*, there is a gland analogous to Cowper's

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on each side of the cloaca. They are small oval bodies, containing a narrow cavity internally, from which a long duct proceeds. It passes through the constrictor muscle of the cloaca, and goes to join the little canal by which the urethra opens into the cloaca. These glands are surrounded by a very strong muscle, which urges their fluid out when occasion requires.

The *squirrel* has two large vesicles, cone-shaped, and coiled upon themselves. The top of these has thick glandular coats, and is divided, interiorly, into a number of little cells. The glands both open into a cavity in the bulb of the urethra, which is continued into a canal that extends to the bend of the penis when it opens into the urethra. The *alpine marmot*, and the *bobac*, resemble the *squirrel* in the structure of their Cowper's glands.

The *boar* has these glands in the form of long flattened cylinders. Their substance has a firm texture; it contains small cells, which open into larger ones, and they again join to form a common cavity, from whence a canal proceeds to open upon the side of the urethra, within the bulb. Their muscle has oblique fibres. The glands of Cowper are very large in the *elephant*, in proportion to the prostates, as before-mentioned. They have an irregular form, as if lobulated. There is a distinction of two portions to be observed: the first is situated next the bulb of the urethra, and is small: it is divided internally into cells, which are of different sizes, the smallest being external, and the larger opening at last into a common cavity in the centre of this part of the gland, which furnishes a duct to join the principal duct that comes from the rest of the gland. The larger portion of the gland contains two central cavities, which each give origin to a duct. These two ducts concur to form the principal duct above-mentioned. It proceeds, for some way, in the parietes of the urethra, before it opens into the canal. The glands of Cowper have a very thick muscle in this animal; the fibres of which are collected upon a tendon that is attached to each side of the corpora cavernosa.

In the *camel*, the glands of Cowper resemble, in figure and size, pigeon's eggs; their texture is close; and their single excretory duct terminates within the bulb of the urethra. The same structure is observed in the other *cloven-hoofed* quadrupeds which possess these glands. The muscle for compressing them in this tribe is very strong.

The figures which illustrate the *male organs* are found in *Plates* VII. and VIII. of the *Anatomy of Mammalia*.

Fig. 7, in *Plate* VII., exhibits the os penis of the *dog*: *a* points out the groove in which the urethra is inclosed for some distance. *Fig.* 8, of the same plate, is a view of the os penis in the squirrel. *Fig.* 1, in *Plate* VIII., shews a transverse section of the penis of the *kanguroo*, in which the canal of the urethra, as indicated by *a*, is seen in the middle of the united corpora cavernosa. *Fig.* 2, of the same plate, is a similar section of the *kanguroo's* penis nearer the end, in which the urethra is seen to be gaining the side of the penis. *Fig.* 3, of the same plate, is a longitudinal section of the penis of the *dog*, after the cellular structure had been injected with quicksilver, dried, and emptied: *a*, the glans penis; *b* is the bulb behind it; *c*, the trunks of the veins going backwards from the bulb, which are compressed by the sphincter vaginæ of the female during the coitus. *Fig.* 4. is a view of the penis of the *guinea-pig*: *a* shews the glans, armed with horny scales; *b* are the hooks that come forth from the pouch in which the urethra terminates; *e*, *c*, the muscular fasciculi that retract the pouch. *Fig.* 5. is the penis of the *cat*: *a*, the glans furnished with reflected horny spines. *Fig.* 6, of this plate, represents the male organs of the *kanguroo*; *s* is the urinary bladder; *q*, the ureters; *r*, the vasa deferentia; *p*, the first part of the urethra, which is inclosed in the prostate gland; *a*, *b*, and *c*, are the three glands of Cowper, on each side; *d*, *d*, are the two branches of the bulb of the urethra, each enveloped in its proper muscle; *e*, *e*, are the two branches of the corpora cavernosa, inclosed by their muscles; that on the right side is laid open longitudinally to expose its interior, and the section of the muscle; *g* is a portion of the sphincter; and *k* is a portion of the levator ani muscle; *i*, the rectum; *l*, the anus; *o* is the pointed glans of the penis. *Fig.* 6, of *Plate* VII. exhibits the male parts of the *ichneumon*: *a* is the bladder; *b b*, the ureters; *c*, *c*, their orifices in the neck of the bladder; *d d*, are the vasa deferentia; *e*, *e*, their orifices in the urethra; *f*, *f*, *f*, *f*, the different lobes of the prostate gland; *h* is Cowper's gland of the left side exposed, the muscular sac in which it is inclosed being laid open; *i*, the opposite gland, covered with its muscle; *k* is the excretory duct of the left Cowper's gland; *l*, an opening seen at the lower part of the glans penis, which leads into the cell where both the urethra and excretory ducts of Cowper's glands terminate; *m* is a part of the ischio-cavernosus muscle of the right side; *n n*, the rectum, at the lower part of which the anal glands are seen, which are already described and referred to under the head of the *excretory glands* in this article. *Fig.* 7, of *Plate* VIII. exhibits the male organs in the *phascolomys* (*didelphis ursina* of Shaw): *a*, the urinary bladder; *b*, *b*, the ureters; *c c*, the vasa deferentia; *d d*, the testes, of which the one on the left has the tunica vaginalis slit open; *k*, the first portion of the urethra; *l*, *l*, the branches of the corpora cavernosa enveloped in their muscles; *m*, *m*, the branches which form the bulb of the urethra, covered also by muscle; *n*, *o*, two of the glands of Cowper, seen on each side; the third are concealed by the branches of the bulb of the urethra; *q* is the glans penis; *r*, *r*, the retractor muscles; *s* is the rectum. *Fig.* 5, of *Plate* VII. is a view of the organs of generation in the male *echidna hystrix*; *a a*, the singular termination of the penis in this species; *b*, the body of the penis; *c*, the cloaca; *d d*, the rectum, slit open and divided, to shew the canal which conducts the urine and semen to the cloaca; *g* is that canal laid open; *f*, *f*, orifices of glands; *e*, *e*, Cowper's glands; *k*, urinary bladder; *i*, its opening into the urinary canal; *l l*, the vasa deferentia; *n n*, the epidydimis of each side; *m*, *m*, the two testicles. *Fig.* 8, in *Plate* VIII. represents one lobe of the vesiculæ seminales of the *hedge-hog*, which is seen to be composed of convoluted tubes. *Fig.* 9, of the same plate, shews the single vesicula seminalis of the *hare*; *a*, the penis; *b*, the urinary bladder; *c*, the vesicula, with its two horn-shaped processes. *Fig.* 10. is a view of one of the lobes of the prostate, or, as Cuvier calls it, accessory gland of the *hedge-hog*.

Female Organs of Generation.—The orifice of the *vulva* is not provided, in mammalia, with either the *external* or *internal labia*. It is a simple fissure in most cases, taking the direction of the body. The *hyæna*, however, has this slit placed transversely. In the *saltigrada*, the orifice of the vulva is circular, and in many of them, and in the *marsupial* animals, it is surrounded by a sphincter, common to it and the anus.

The *vulva* is not a mere entrance to the vagina, as in the human subject, but forms most commonly a canal of some length, preceding the true vagina. In the *prehensile-tailed*, and other American species of *monkey*, this canal is, according to Cuvier's observations, as long as the vagina. In the *bear*, it is even much longer. In some cases, however, the vulva is little more than the aperture of the vagina. It has been observed to be so in the *lemur*, the *agouti*, *paca*, and *guinea-pig*. In the *baboon* also, it is a very shallow cavity.

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The internal ſurface of the vulva has uſually ſlight rugæ, which diſappear upon the part being ſtretched. In the *tiger* they are oblique in their direction, and very ſmall. They are tranſverſe in the *biſulca* and the *hyæna*, in which they are numerous, fine, and undulating. The *daman* has the interior of the vulva ſmooth. There are glands analogous to thoſe of Cowper, the ducts of which paſs into the ſides of the cavity of the vulva. Theſe glands are remarkably large in the *cat* genus and *marſupial* tribe of mammalia. They are compreſſed by a muſcular inveſtment.

The *clitoris* of mammalia is of various figures, ſizes, and ſtructures.

Its ſituation in all quadrupeds is neceſſarily the reverſe of that in the human ſubject: the part of the vulva next the pubis being the loweſt in all animals whoſe ſtation is on four legs.

The clitoris is ſituated farther in where the vulva forms a canal, than in other caſes. In the *bear* it is incloſed in a pouch, which opens into the vulva by a ſmall orifice. In the *baboon*, and in the *rat* tribe, the clitoris is ſituated externally to the vulva: in the latter animals, the ſkin before the vulva forms a projection, which ſerves as a ſort of prepuce to the clitoris, at which place alſo the urethra terminates; there are, therefore, in the *rats* three apertures in ſucceſſion; the orifice of the urethra, the opening of the vulva, and that of the anus.

The clitoris of quadrupeds ſo generally reſembles the penis of the males in the ſame ſpecies in form and ſtructure, that it has been ſuppoſed they were ſimilarly conſtructed in every inſtance. There are, however, exceptions to this rule: the clitoris in the *quadrumana*, the *civet*, and the *dog*, wants a bone, although there is an os penis in theſe animals.

The ſize of the clitoris is frequently greater in proportion than in the human ſubject: it is particularly ſo in the *monkies*, *lemurs*, moſt of the *digitigrade* and *ſaltigrade* quadrupeds. It is very long, and curved upon itſelf, in the *bear*. In the *marſupial* mammalia, which have a bifid penis, the clitoris is alſo double.

The prepuce of the clitoris ſometimes forms a deep ſac, in which the latter is nearly concealed, as in the *dog* genus. This prepuce is furniſhed with numerous ſebaceous glands, like thoſe of the penis, and in the *rat* kind they are extremely large.

The *orifice of the urethra* is found pretty uniformly upon the extremity of the inferior part of the vulva; it is, conſequently, often much deeper ſeated in mammalia than in the human ſubject.

In the *prehenſile-tailed monkies*, and ſome others of the new continent, the urethra opens in the ſubſtance of a ſtrong fold, extended from the hymen. Sometimes this canal is found to open in a ſlit between two tubercles, or folds, of the inner membrane of the vulva, which are ſometimes extended upon the ſides of the groove on the back of the clitoris, to conduct the urine out. In other caſes, the urethra opens in the middle of a papilla. This orifice is in the baſe of the clitoris in the *agouti* and *paca*; but in the *lemurs*, properly ſo called, and the *lori*, the urethra paſſes along the back of the clitoris, and opens near its end.

A general opinion has prevailed that the *hymen* is peculiar to the human ſubject, which ſeems to have ariſen from ſuppoſing this part to be formed for the ſole purpoſe of proving the virginity, and, conſequently, the purity of the mind in the female of the human ſpecies. Similar obſtacles, however, to the congreſs of the ſexes, are found in a conſiderable number of mammalia, and probably exiſt in many other ſpecies that have not yet been examined for this circumſtance.

In the *ſimia paniſcus*, and *ſtriated ape* (*ſimia jacchus*), the *hymen* conſiſts of two ſemi-lunar folds of membrane, the pointed corners of which unite, above and below, on two columns of the ſuperior and inferior parietes of the vulva. Theſe folds were found to be nearly effaced in an *old monkey* (*ſimia paniſcus*).

The *northern lamantin* has been deſcribed by Steller as having a ſtrong ſemi-lunar membrane ſituated at the inferior part of the opening into the vagina from the vulva.

Cuvier found a very decided membranous partition of the vulva from the vagina in a young *daman*. It was a circular fold of thin membrane, nearly of equal breadth at every part. The ſame author diſcovered in the *brown bear* a thick fold of the internal membrane, which projects in ſuch a manner from above, as to convert the aperture of the vagina into a ſimple tranſverſe fiſſure.

In the *hyæna* there is alſo a thick broad fold of membrane, which forms two ſinuoſities, the one above the other, projecting from the ſide of the vulva, and having the figure of a beak, between which there is a narrow tranſverſe ſlit, that leads from the vulva into the vagina.

The *otter*, the *bitch*, the *cat*, and the *cloven-hoofed* quadrupeds, have been obſerved to have the vulva ſeparated from the vagina by a membranous circle, which approximates, or unites, either directly, or by means of little tranſverſe bands, the longitudinal folds of the vagina that ariſe from this circle.

The *vagina* varies very much with reſpect to its ſize. This is chiefly regulated by the length of the vulva, and the magnitude of the fœtus.

It is uſually leſs wide than the vulva in thoſe mammalia which have not had any young.

The length of the vagina, in proportion to that of the vulva, varies in different ſpecies of the ſame genus: thus, in the *prehenſile tailed monkies*, and ſome other *ſimiæ*, it does not exceed the vulva in length, but in the *baboons* it is much longer.

The vagina is about half the length of the vulva in the *brown bear*. It is twice the length in the *cat* and *dog* genera. In the latter there is a remarkable dilatation, which is adapted to hold the bulb of the *dog's* penis.

There are generally longitudinal rugæ to be obſerved upon the internal ſurface of the vagina. The ſtructure of the vagina is very curious in the *bears*. The longitudinal rugæ are interſected by deep fiſſures, which divide them into ridges. There is one circular fold that entirely conceals the *os uteri*. It has a crucial opening, or one in the form of a T, which does not altogether correſpond with the orifice of the uterus. This ſtructure, added to the form of the hymen already mentioned, muſt produce great obſtruction to the reception of the male *bear*, and to the paſſage of the ſemen into the uterus.

The rugæ of the vagina are tranſverſe in the genus *delphinus*, and in the *hyæna*, although Blumenbach denies that any of the mammalia have the rugæ tranſverſe, except the *monkey* and the *mare*. He ſeems to have miſtaken the folds of the vulva in the *mare* for the rugæ of the vagina.

In the *whales*, the vagina is deſcribed by Hunter as being ſmooth upon the internal ſurface for the firſt half of its length, and afterwards valvular. He ſtates the number of theſe valves to be from ſix to nine; to be directed outwards, and each of them to reſemble an *os tincæ*. At firſt they do not go quite round, but afterwards make complete circles.

The *hyæna* has alſo tranſverſe rugæ in the firſt half of the vagina.

The vulva and vagina ſeem to be confounded with each other

other in the *tardigrada*, and in the *edentata*, the canal which conducts to the uterus in thefe orders being extremely fhort.

The *uterus*, in a few tribes of mammalia, poffeffes the fame triangular form as in the human fubject; fuch is the cafe in the *tardigrade* quadrupeds, the *ant-eaters*, the *pangolins*, and the *armadillos*. It is nearly fimilar in the *monkey* kind, but in thefe the body is more round, and the neck is diftinguifhed from the reft of the uterus by a contraction.

In all the remaining orders of mammalia, except the *marfupial* animals, the body of the uterus is more or lefs prolonged on each fide, and forms what have been called *cornua*. The extent of thefe lateral divifions is, in many inftances, very confiderable; they often reach into the loins, in which cafes the *broad ligaments* of the uterus are much fpread out, and in the large quadrupeds there are mufcular fibres placed between their laminæ. According to Cuvier thefe form different fafciculi in the *cow*, one of the ftrongeft of which extends from the ovary to the neck of the uterus. It approximates thefe parts, but for what purpofe is not known. Befides thefe there are fome tranfverfe fibres, which go from one horn of the uterus to the other, in the firft third of their length. The round ligaments alfo poffefs, in general, mufcular fibres. The divifion into cornua is lefs marked in the *lemurs* than any other genus. They have the uterus rather formed into two lobes than cornua.

The neck of the uterus is very fhort in fome fpecies; in the *agouti*, the *paca*, and the *guinea-pig*, it can fcarcely be faid to exift, and in the *hare* and *rabbit* there is no part correfponding to the neck, but the two branches or cornua of the uterus open immediately by two diftinct orifices into the vagina.

In the *ornithorhynchus* and *echidna* there is no neck or body, properly fpeaking, to the uterus. The organ confifts merely of two large convoluted tubes, which terminate by two diftinct orifices in a common canal, which leads from the bladder to the cloaca, and appears to ferve alfo the purpofe of the vagina. The firft portion of thefe tubes is the wideft. This correfponds apparently to the cornua uteri. The fucceeding part is the moft contracted; but terminates in a wide mouth that feems to fupply the place of the Fallopian tube, which is wanting in thefe animals.

The plan on which the uterus is formed in the *marfupial* animals is very peculiar. There are parts correfponding to the cornua, and to the body of the uterus, and in addition to thefe, two lateral canals. The cornua are oval cavities continued into fmall canals that extend to the ovaries, and are the Fallopian tubes. The oval cavities have been generally confidered as the dilatations of thefe tubes, but Cuvier afferts that they are very diftinct from the fmall parts of the canal which are really the Fallopian tubes. The openings of the cornua into the part correfponding to the body of the uterus are feparate from each other, and are guarded by valvular folds. The body of the uterus is a ftraight canal, which is wideft at the fundus, or the part that receives the horns, and becomes gradually lefs capacious as it approaches its termination, which is in the vagina, clofe to the orifice of the urethra. The body of the uterus is a fingle cavity in the *kanguroo*, *phafcolomys*, and the *phalanger*; but in the *Virginian opoffum*, the *wombat*, and *koala*, the uterus is double, or confifts of two cavities. Mr. Bell has defcribed thefe in the *wombat* as having a pyramidal form. The right was confiderably the largeft, being about the fize of a pullet's egg. It fhould be obferved, however, in this inftance, that the right uterus was gravid. From the fundus of each of thefe uteri there was a Fallopian tube, nearly three inches long, which terminated at the ovarium. This tube had no dilatation at its junction with the uterus, which appears to confirm Cuvier's opinion of the dilatations in the *kanguroo*, &c. anfwering the purpofes of the cornua uteri. The double uterus of the *wombat* had a common neck half an inch long, and of confiderable breadth and thicknefs, which however had two orifices in the vagina. In the *Virginian opoffum*, the two cavities of the uterus are formed by a longitudinal feptum of the part correfponding to the body, and each of thefe cavities has a feparate opening into the vagina. In the *kanguroo*, *phafcolomys*, and *phalanger*, there is but one opening from the uterus into the vagina, which is ftated by Mr. Home to be fo fmall in the virgin *kanguroo* as to be fcarcely difcernible.

By comparing the number and fituation of the communications of the uteri in the vagina, with the form of the male organs in the *marfupial* mammalia, it will be fufficiently plain that the femen paffes, as in other cafes, into the uteri directly, and not by the circuitous courfe of the lateral canals, as fome have fuppofed.

The *lateral canals* arife in the *kanguroo* from the fundus of the body of the uterus where the cornua terminate, and in the *wombat* from the pofterior furface of the common neck of the two uteri, near its junction to thofe uteri. The canals defcribe a femicircular curve, and terminate in the vagina, on each fide of the orifice or orifices of the uterus.

The ufe of thefe lateral canals it is difficult to explain. It has been obferved, that the ovum of the *marfupial* animals had no connection with the parietes of the uterus, but were involved in a fpecies of jelly, which has been fuppofed to fupply the nourifhment of the fœtus. Mr. Home has conjectured that the jelly is fecreted by the lateral canals, becaufe they become fhut towards the vagina, enlarged throughout, and maintain a free communication with the uterus after impregnation. We are not, however, fufficiently acquainted with the hiftory of geftation in thefe animals, to determine whether the changes in the canals fubfequent to impregnation, may not be required for other purpofes than the fecretion of the jelly found in the uterus.

The uterus has but rarely, in mammalia, that projection around its orifice which is called the *os tincæ* in the human fubject. Moft commonly the os uteri is a tranfverfe flit at the end of the vagina, and fo much on the lower part of that canal, that the fuperior parietes form a cell or cul-de-fac above it. In the *porcupine* the os uteri has fo flight a prominence, that it appears as an opening of the inferior part of the vagina. In the *bear*, *cow*, and others, the vagina makes a projection which tends to obftruct the paffage into the uterus.

The *ftructure* of the uterus is the fame in the *monkey* and the human fubject; but in the other mammalia the parietes are thin, and generally compofed of layers of red mufcle, fuperadded to the internal membrane, and external coat in the fame manner as the alimentary canal is formed. Thefe mufcles are particularly plain in the double uterus of the large quadrupeds. There is a tranfverfe layer of mufcle upon the cornua covered by a thin layer of longitudinal fibres. The neck of the uterus has commonly the tranfverfe layer only. The principal thicknefs of the neck of the organ in the *cow* is, however, compofed of a white hard texture, refembling the fubftance of the human uterus.

The internal membrane of the body of the fingle uterus, and of the cornua of the double uterus, ufually exhibits longitudinal folds, but in the *civet* they are tranfverfe, and inferted into each other.

The changes of ftructure which the uterus undergoes after impreg-

impregnation will be defcribed under the head of OVUM, *Hiftory of, in viviparous animals*, in the fubfequent part of this dictionary.

The ufes of thefe changes will be more eafily underftood, by being contemplated in conjunction with the parts immediately connected with the embryo. We fhall alfo referve the account of the *mammæ*, and *marfupia*, or *fuckling pouches*, for the fame head, as thefe organs are likewife fubfervient to the dependent ftate of exiftence of the young animal.

In *Plate* IX. of the *Anatomy of Mammalia*, the ftructure of the unimpregnated female organs is exemplified. *Fig.* 1. reprefents the uterus, vagina, and vulva of the *bear*, a portion of the parietes of the two latter parts being removed, to expofe their internal furface: *a* is the mouth of the vulva; *b* is the clitoris, half concealed in its prepucial pouch; *c*, the internal furface of the vulva; *d*, the valvular fold correfponding to the hymen, under which the orifice of the vagina is feen; *e*, the vagina laid open; it is fhorter than the vulva, and its longitudinal folds are croffed by grooves; *f*, the crucial flit that leads to the uterus; *g*, the body of the uterus; *h*, *h*, the two cornua. *Fig.* 2. fhews the double uterus of the *rabbit*: *a* is the *vulva* opened; *b* is the clitoris; *c*, the vagina laid open; *d*, *d*, the orifices of the two uteri or cornua in the vagina. *Fig.* 3. exhibits the female organs of the *ornithorhynchus paradoxus*: *a*, the *cloaca* laid open; *b*, the vagina, or canal which receives the urine, and the two lateral tubes or oviducts; *c*, the opening into the bladder; *d*, *d*, the two orifices of the oviducts; *e*, *e*, the dilated parts of the ducts, which apparently correfpond to the cornua uteri; *f*, *f*, the contracted portions of the ducts which reprefent the Fallopian tubes; *g g*, the termination of the ducts, which probably fupply the place of the infundibula of the Fallopian tubes. *Fig.* 4. is a view of the female parts in the *kanguroo*: *a* is the fhort canal correfponding to the vulva and vagina laid open; *b* is the clitoris; *c*, the meatus urinarius; *d*, *d*, the lateral canals arifing at the fundus of the body of the uterus, and terminating in the vagina; *e*, the middle canal which correfponds to the body of the uterus in other mammalia; *f*, *f*, the dilated parts which Mr. Home has confidered as belonging to the Fallopian tubes; but which Cuvier, more correctly, in our opinion, calls the cornua of the uterus; *g*, *g*, the parts of the tubes which really reprefent the Fallopian; *h*, *h*, the ovaries; *i*, *i*, the ureters.

If we except the formation of the tubes which correfpond to the *Fallopian* in the *marfupial* mammalia and the *ornithorhynchus*, and the *echidna*, there is fcarcely any peculiarity to be remarked in the *Fallopian tubes* in mammalia. Blumenbach ftates that they are found to be convoluted, fometimes fo as to form a knob, as in the *pygmy* (*fimia fylvanus*), and in the *opoffum*. The fimbriated extremity of the tube is conftructed like a funnel in the *rabbit*, &c.

The *ovaries* of mammalia poffefs the fame ftructure, as to all material circumftances, with thofe in the human fubject. The figure of thefe bodies is frequently more round in their fhape than in woman. In general, the veficles containing the ova are buried in the fubftance of the ovaries, as in thofe of the human fpecies; but in fome quadrupeds they are found near the furface, fo that the ovaries appear tuberculated: this has been obferved in the *pig*, the *civet*, and in the *opoffum*, the ovary of which laft is entirely made up of the veficles. The moft unufual form of the ovary is in the *hedge-hog*. The *veficulæ Graafianæ* are contained in capfules, which are diftinct externally, but connected together by their footftalks, fomewhat like the *racemus vitellorum* of birds.

The *corpora lutea* grow much larger than the cells of the ovary from which the veficles have been expelled, at leaft in fome quadrupeds. We have obferved them, in the *fheep*, to be compofed of a folid, firm, flefhy fubftance, interfected by membranous lines, fomewhat like a carcinomatous tumour, and to be about the fize of a fmall cherry.

Fig. 5. *Plate* IX. of the *Anatomy of Mammalia*, exhibits the ovary of the *hedge-hog*, which appears like a clufter of ova bound together. *Fig.* 6. reprefents a portion of the ovary of the *fheep*, from which an ovum had been recently difcharged: *a* is the vacant cell. *Fig.* 7. is another portion of the ovary of a *fheep*, in which the depofit above defcribed had been made in a cell, after the ovum had left it: *a* is the fection of the fubftance of the ovary; *b* is the fection of the new fubftance, or, as it is called in other cafes, the *corpus luteum*.

Bones.—The fkeletons of mammalia exhibit many important peculiarities, not only as compared with that of the human fubject, but with each other. This clafs has great varieties in the modes of locomotion; and confequently in the organs by which thefe are effected. In all the deviations in the mechanifm of the fkeleton, the *quadrumanous* tribe feems to be the model. Thus, the parts which conftitute the arm and hand, or are neceffary to make a prehenfile member, are found in thofe that employ the extremities for walking, flying, or fwimming, in a greater or lefs degree obliterated, changed, or concealed; although the members have fo different a form externally. The long tail alfo feems to be the model from which the fhort coccyx of fome mammalia and of man is the deviation.

The interior compofition of the bones of mammalia is generally the fame as in man. Their texture is moft clofe and denfe in the fmall quadrupeds. We have obferved the bones to be particularly hard and fragile in the *kanguroo*, but this might have been from the manner in which they had been prepared. The bones of the *cetacea* exhibit very plainly the fibrous ftructure, it being more loofely arranged than in the *terreftrial* mammalia. In the long bones, the offeous fibres can be eafily feparated, and the cells of the fpongy bones are exceedingly evident. Both in the *feals* and the *cetacea*, there are no large medullary cavities in any of the bones. The texture of the bones in thefe animals has the effect of rendering them lighter than thofe of other mammalia; and therefore better fuited to locomotion in the water. The vertebræ of the *whale tribe*, efpecially thofe towards the end of the tail, are much more denfe in their ftructure than the other bones. All the cells of the bones in thofe animals are filled with fluid oil.

It has been attempted to eftablifh a regular gradation in the proportions of the magnitude of the cranium to that of the face amongft the different mammalia, with the view of fixing the relative fize of the brain, and confequently the degree of intelligence poffeffed by the animal.

Daubenton and Camper propofed meafuring the relative fize of the cranium, by fuppofing two ftraight interfecting lines to be drawn upon the cranium and face. The angles which they exhibit in different fpecies determine the relative bulk of thefe parts. Camper's method was the moft accurate. He drew one line upwards, which touched the incifor teeth of the upper jaw below, and the greateft projection of the forehead above; this he called the *facial line*. The other line was fuppofed to pafs along the loweft part of the cranium. It was taken in the plane correfponding to the external meatus auditorius and the floor of the noftrils, and was called the *bafilar* line. The angle formed between thefe two lines determines, according to Camper, the differences of the crania of animals, as well as the national phyfiognomy of the various races of mankind.

It

It is obvious, however, that the projection of the frontal ſinuſes in many of the large quadrupeds, eſpecially the *elephant*, muſt, in a degree, interfere with the accuracy of this mode of meaſurement. The great ſize of the naſal cavity in ſome ſpecies, and the prolongation of the jaws in others, will alſo form exceptions to a rule founded upon this principle of meaſurement. Blumenbach ſtates that about three-fourths of all the ſpecies of quadrupeds with which we are acquainted, whoſe crania differ extremely in other reſpects, have the ſame facial line.

Nevertheleſs it muſt be admitted, that the proportions which the cranium (as indicating the bulk of the brain) bears to the face, ſerve in general to determine the mental endowment of animals. It is ſtrikingly proved by the *monkey* tribe, which moſt nearly approach the human ſubject in the form of the head, poſſeſſing ſo much more of the mental character of man than any other animal in the claſs.

The following table will ſhew the number of degrees of the facial angle in ſeveral ſpecies of mammalia.

Young ourang-outang - - -	67°
Sapajous, or *prehenſile-tailed monkies* -	65
Talapoin monkey - - - - -	57
Young mandril - - - - -	42
Coati - - - - - -	28
Pole cat - - - - - -	31
Pug dog - - - - - -	35
Maſtiff dog, the tangent taken at the external ſurface of the cranium - - -	41
Ditto, at the internal ſurface - -	30
Hyæna, at the external ſurface - -	40
Ditto, at the internal - - -	25
Leopard, at the internal ſurface: a tangent cannot be drawn to the external ſurface, on account of the convexity of the noſe -	28
Hare - - - - - -	30
Marmot - - - - - -	25
Porcupine - - - - -	23

Theſe three laſt are meaſured by the internal ſurface of the cranium, it not being poſſible to bring a tangent to the external.

Pangolin - - - - - -	39°
Barbirouſſa - - - - -	29
Ram - - - - - -	30
Horſe - - - - - -	23
Dolphin - - - - - -	25

According to this table, the facial angle of the *ourang-outang* does not differ materially from the human, the adult *negro* having it only 70°. In the *European head* it is 85, a difference generally conſidered as accompanying a gradation of the intellectual powers in theſe races of mankind. This opinion is not a modern one, but ſeemed to have been entertained by the ancients, who always made the cranium, in the ſtatues of their gods and heroes, project more than is obſerved in any human head. The facial angle of many of the antique ſtatues is 100°

Another method of arriving at the relative bulk of the cranium and face, is to meaſure and compare the area of each, after there has been a vertical and longitudinal ſection made of them. The area of the ſection of the European human cranium is four times as large as that of the face; the lower jaw not being included. In the *negro*, the cranium remaining the ſame, the area of the face is increaſed about $\frac{1}{5}$th. In the *Calmuc* only $\frac{1}{10}$th. In the *ourang-outang* the proportion of the face is further increaſed. It is nearly equal to the half of the cranium, in the other *monkies* and the *digitigrade* quadrupeds.

In the other orders, the area of the face is generally larger than the cranium. The *hare* and *marmot* have it $\frac{1}{3}$d larger. It is nearly twice as large in the *cloven-footed* quadrupeds; ſtill more than double the ſize in the *porcupine*; nearly three times in the *hippopotamus*, and almoſt four times the ſize in the *horſe*.

The *cetacea* have the face ſo much flattened, in conſequence of wanting the naſal cavity, that it does not admit of a fair compariſon with the cranium.

Theſe modes of meaſuring the cranium only indicate the extent of its circumference in one direction. In order to arrive at the real bulk of the cranium, or of its contents, it would be neceſſary to make a vertical ſection from one ſide to the other, and a tranſverſe ſection, ſo as to detach the upper half of the ſkull from the lower, as is done for the diſſection of the brain; or, what would be ſtill more ſatisfactory, to weigh the brain, firſt having aſcertained the variations in the weight of a given bulk of brain in different ſpecies, if any do exiſt.

The number of bones compoſing the cranium in mammalia is frequently different from what is found in man. In ſome ſpecies certain bones remain during life in ſeparate pieces, while in others, the ſutures that are always found in the human cranium are ſo early obliterated, that two, three, or more bones are conſolidated into one.

The *quadrumanous*, and all the *hoofed* mammalia, have frequently the ſphenoid bone in two parts. The ſuture of the middle of the os frontis is found in the *digitigrada*, *ſaltigrada*, the *hog*, *tapir*, *hippopotamus*, *rhinoceros*, *ſeal*, and *morſe*. In the *cloven* and *ſolid-footed* quadrupeds it exiſts for a conſiderable time. The bone containing the cavity of the tympanum is divided by a ſuture from the reſt of the temporal bone in the *cat*, *dog*, and *civet* genera; the *ſaltigrada*, the *ruminants*, *ſolipeda*, *ſeal*, *lamantins*, and *cetacea*.

The oſſa parietalia are united into one bone in the *chiroptera*, *digitigrada*, *hare*, *cavy*, *porcupine*, *marmot*, *rat*, and *ſquirrel*; the *hog*, *tapir*, *hippopotamus*, *rhinoceros*, the *ruminants*, the *ſolipeda*, and *lamantin*.

In the *cetacea* the parietal, occipital, and temporal bones are united together; although the ſphenoides is long, diſtinct, and even divided into ſeveral pieces.

All the ſutures of the cranium are very ſoon obliterated in the *elephant*.

The bones of the cranium in mammalia have not always the ſame connections with each other as in man. Even the *ourang-outang*, whoſe head bears ſo ſtrong a reſemblance to the human, does not agree in this reſpect. This animal, as well as many other ſpecies of *monkey*, has the temporal wing of the os ſphenoides very narrow, and not extended to the parietal bone: the temporal bone is partially joined to the frontal. The *jocko* has the temporal bone articulating by its ſquamous portion immediately with the os frontis, the temporal ala of the ſphenoides not being connected with either the frontal or parietal bones. In the *ſapajous*, or *monkies* with *long prehenſile tails*, the parietal bone is articulated with the os malæ. In the *howling baboons*, and the *digitigrade* quadrupeds, the bones of the cranium have the ſame connections as in man.

In all the *ſaltigrada*, the *armadillos*, *pangolins*, and *ſloths*, the ſphenoid does not articulate with the parietal bone; but in the *ant-eater* theſe two bones are extenſively connected.

In the *ruminants* the os ſphenoides has the ſame connections as as in man, but in many of the *many-hoofed* quadrupeds the ſphenoides is not joined with the parietalia.

The *ſutures* of the cranium of mammalia, in general, are apparently leſs marked than in man. Their denticulations are, however, very plain in the *ruminating* quadrupeds. The *oſſa triquetra* are not often met with. Blumenbach reports that he poſſeſſes ſpecimens of them in the *ourang-outang* and the *hare.* All the ſutures in the *cetacea* are ſquamous.

There are conſiderable varieties in the form of the different bones of the cranium. In the *ourang-outang* the *os frontis* has a more irregular outline than in man; its proceſſes are more eminent, and the orbitar arches are more elevated. This bone is triangular in the *monkies,* with long prehenſile tails; but in the other ſpecies of *ſimia* it is oval, and the arches of the orbits are flattened ſuperiorly, and prominent. The orbits of the *monkey* tribe, although opening anteriorly like the human, are much cloſer together.

The orbits are firſt obſerved to incline outwards in the *lemurs.*

In many of the quadrupeds which have the orbits directed to each ſide, the os frontis has a ſquare figure.

The *ſaltigrada* and the *hog*, however, have a notch or vacancy in the orbitar arch, which gives, in a degree, a rectangular figure to their frontal bones. The orbits of the *beaver* look upwards. In the *digitigrada*, the *cloven* and *ſolid-footed* quadrupeds, the orbitar arch has alſo a deficiency at the poſterior part.

The frontal bone forms a vault over the orbits in the *hippopotamus*, the *ruminants*, and the *horſe.*

In the *mole*, *ant-eaters*, and *cetacea*, the orbits are ſo ſhallow, that they can hardly be ſaid to exiſt. There are alſo no orbitar arches, properly ſpeaking, in the *hedge-hog*, *ſhrew*, *ſeal*, *morſe*, or *rhinoceros.* In the *cetacea* the frontal bone is narrow from before backwards; the proceſſes corresponding to the orbitar deſcend below the maxillary bone.

The *parietal* bones of the *ourang-outang* have the inferior anterior angle very prominent, on account of the ſmall extent of the ſquamous portion of the os temporis. It is the ſame, or more ſo, in the other *monkies.*

This angle of the parietal is ſtill more prolonged in the *lemurs.* It is very broad and much extended in the *ant-eater*, the *ſquirrel*, &c.

There is a ſeparate piece of bone ſometimes found in the *ſaltigrade* mammalia, between the parietal and occipital bone. It has been deſcribed in the *common mouſe* by Meyer, under the name of the *os tranſverſum.*

The ſingle parietal bone of the *ruminants* has the occipital creſt before it in the *antilope bubalis*, and reſembles a ribbon ſurrounding the back part of the head.

The *occipital bone* departs more from the form and poſition it has in the human head, than any other bone of the cranium.

The occipital ridge or creſt is not more marked in the *ourang outang* than in the human ſubject; but in the other *monkies*, eſpecially thoſe with elongated jaws, the os occipitis begins to form the angle at the creſt, which is ſo ſtriking in moſt quadrupeds. The tranſverſe occipital ridge is very prominent in the carnivorous quadrupeds, whether *digitigrade* or *plantigrade*, making the upper part of the occiput angular, and beneath this the cranium flat or concave. The longitudinal occipital ridge is very ſtrong in the *badger.*

The *ruminating* quadrupeds, likewiſe, have a very projecting occipital ridge, and the *beavers* are remarkably ſo. In the *pig* the occiput has the figure at the upper and back part of a very acute angle.

The occiput is round in the *ant-eater* and *cetacea;* it is ſmooth and without proceſſes in the *mole.*

The *elephant* has the occiput nearly ſquare, and the condyles at the poſterior extremity. There is no occipital protuberance, but a depreſſion in place of it, containing a longitudinal ridge for the inſertion of the ligamentum nuchæ.

The *maſtoid proceſs* belongs to the occipital bone in all mammalia, except the *monkey*, in which it is an appendix of the os temporis, as in man. This proceſs in the *apes*, and moſt of the *monkey* kind, is nearly obliterated. Moſt of the *digitated* quadrupeds want the maſtoid proceſs, and merely have a ſlight protuberance from the projecting part of the cavity of the tympanum; or this cavity itſelf ſupplies the place of the maſtoid proceſs. The *cavy*, *hog*, *guinea-pig*, the *cloven* and *ſolid-footed* quadrupeds, &c. have a long maſtoid proceſs behind the cavity of the tympanum.

The poſition of the *foramen magnum* is remarkably different from that of the human ſubject; it removes from the under part of the head, even in the *monkey* tribe, and in the true quadrupeds is found at the poſterior part of the cranium, and ſituated ſo, that the edge, which is poſterior in man, is directed obliquely upwards. This edge is in ſome quadrupeds turned directly upwards, or, as in the *alpine marmot*, is even turned more forwards than the other edge of the hole. The relative poſition of the occipital foramen was employed by Daubenton to determine the gradations of the crania of different animals. He drew one line from the edge of the hole, which is poſterior in man, but ſuperior in moſt quadrupeds, as already mentioned, through the lower edge of the orbit: another line was taken in the direction of the foramen itſelf, beginning at its poſterior edge and touching the articular ſurface of the condyles. The angle formed by the interſection of theſe two lines, was conſidered by Daubenton as indicating the variations of form and magnitude of different crania. It has been objected to by Blumenbach, upon the ſame ground that he diſapproved the facial angle of Camper, namely, its not expreſſing all the variations that exiſt.

The *ſquamous* portion of the *temporal* bone, as already noticed, is much leſs extenſive in mammalia, even in the *ourang-outang*, than in man. The principal part of this bone, as it appears externally in many quadrupeds, is the zygomatic proceſs. The petrous portion of the os temporis will be deſcribed along with the other parts of the organ of hearing, to which it properly belongs.

The *zygoma* is not merely formed by the junction of the proceſſes of the temporal and malar bones, but has an intermediate piece of bone in the *otter*, *opoſſum*, *beaver*, *guinea-pig*, &c. Cuvier alſo mentions a particular bone which ſupplies the place of the zygomatic angle of the os malæ in the *green ape*, but which bone is ſoon anchyloſed with other malar.

The zygoma is remarkably broad in the *opoſſums* and the *kanguroo.*

In the *mole*, it is a ſtraight proceſs, not much thicker than a needle.

In the *cetacea*, at leaſt the genus *delphinus*, the zygoma is a very ſlender oſſeous bar.

In proportion to the extent and ſtrength of the maſſeter muſcle, the zygoma forms a curvature in an upward direction, and when this muſcle is leſs conſiderable, the zygoma is either horizontal, or makes a convexity downwards. The zygoma is univerſally arched upwards in the *carnivorous* quadrupeds. The *ſaltigrada* have the convexity downwards, and in the *cavy* and the *paca*, it even extends below the diſtance of the molar teeth.

The

The zygoma of the *sus æthiopicus* is nearly horizontal, but is extremely broad and thick, and forms all the broad part of the cheek under and before the eyes.

The curvature of the zygoma outwards, which gives it properly the name of an arch, depends upon the magnitude of the temporal muscle which passes under it. We, therefore, find the zygomatic arch very wide in all the *carnivorous* tribe of quadrupeds, and particularly so in the *cat* genus, upon which depends the round shape of the head of the *tiger*, *leopard*, *cat*, &c. in a great measure.

The large *herbivorous* quadrupeds, in general, have the zygoma but little arched outwards. It is the same in most of the *saltigrada*.

The zygoma is quite straight in the *mole*, and in the *cetacea*.

It is not found to form an arch outwards, of any consequence, in the *edentata*. In the *Cape ant-eater* it is perfectly straight.

In the *pangolins* and *American ant-eaters*, the zygomatic arch is incomplete; the latter animals have merely two tubercles in place of the processes, which usually form the zygoma.

The zygomatic arch, also, is not complete in the *sloths*. The os malæ terminates posteriorly in two angles; the one superior, which extends above the zygomatic process from the os temporis; the other inferior, which passes obliquely downwards, and is unattached.

We shall describe the *ethmoid bone*, more particularly, under the head of the organ of smelling, by which its uses will be more apparent.

The large *fossæ*, or depressions upon the inner surface of the base of the cranium, are shallow in proportion as the animal is removed from man.

Even the *howling-baboons* have the posterior and intermediate fossæ, and the sella turcica, in the same plane.

Many quadrupeds want the sella turcica, as the *digitigrada*, and most of the *saltigrada*. In the *cavy*, the *rhinoceros*, and the *cloven-footed* quadrupeds, the part having the situation of the sella turcica is even depressed, instead of being elevated.

Some of the spinous ridges on the internal part of the cranium, are often more eminent in mammalia than in man.

In the greater number of the *carnivorous* species, there is a thin projection of bone from the petrous portion of the os temporis, which strengthens the tentorium of the cerebellum. It is usual to say that these animals have a bony tentorium, and to suppose that it is necessary to defend their brain from concussion, during the rapidity of their motions, which does not seem probable, as something of the same structure is found in other species whose movements are slow.

The limits between the middle and posterior fossa of the cranium is formed in the *pangolin* by a large vertical osseous septum, with an oval hole in the middle.

In the *rhinoceros*, the part corresponding to the posterior clinoid processes is not attached to the base of the cranium, but extends like a bridge from one middle fossa to another, while the depression that is in place of the sella turcica communicates under this bridge with the cuneiform process of the occipital bone.

The *foramina* upon the inside of the cranium are often less distinct, and consequently less numerous in mammalia than in man.

The *optic foramina* are close together in the *agouti*, being only separated by a thin osseous plate. They are united into one hole next the scull in the *hare*, the *four-toed ant-eater*, and the *elephant*. The *chevrotin* (*moschus*) has but a single optic foramen, which is divided by the vomer.

The *spheno*, or *superior orbitar fissure* in the *ourang-outang*, is similar to that of the human subject; but in almost all the other mammalia it is nearly a round hole. In many of the *saltigrada*, and the *rhinoceros*, *elephant*, and *hippopotamus*, it is incorporated with the foramen rotundum. They are also confounded in the *cloven* and *solid-footed* quadrupeds.

The *foramen rotundum* in the *monkey* is marked with a furrow for some way before it leaves the cranium. This hole is very large, and more of an oval than a round shape in the *digitigrade* quadrupeds.

The *foramen ovale* of the *bear*, *cat*, *civet*, &c. is defended at the external edge by an osseous lamina.

The *bear*, *badger*, *seal*, and *vampyre bat*, have this foramen united into one with the foramen rotundum.

The foramen ovale is thrown into one with the *anterior foramen lacerum* in the *cavy* and *porcupine*. In the *ten-banded armadillo*, and the *four-toed ant-eater*, it is confounded either with the foramina lacera, which are united, or with the foramen rotundum, which is thus rendered very large, and of an oblong form. It is conjoined with the anterior foramen lacerum in the *elephant* and *hippopotamus*. It is very large in the *ruminating* quadrupeds, and does not exist as a separate hole in the *solipeda*.

The *foramen lacerum anterius* is not found in the *monkey* kind, the *digitigrade*, the *squirrel*, and the *ruminating* quadrupeds.

It is very wide in several of the *saltigrada*. It is confounded with the *posterior foramen lacerum* in the *armadillo*, the *hippopotamus*, and *solipeda*.

The *canalis carotideus* is much shorter and less tortuous in the *digitigrada* than in man. There is no canal in the *saltigrada*; the carotid passing immediately through the foramen lacerum. In the *hippopotamus* the carotid canals are lost in the foramina lacera.

The *foramen lacerum posterius* is a very small round hole in the *pangolin* and *sloth*; and in the *elephant* it is very large. In the two first of these animals the anterior condyloid foramen is remarkably large; and in the last there is no hole before the condyles, which shews the connection that exists between these two foramina.

The foramen lacerum posterius is confounded with the anterius in the *rhinoceros*; and the *anterior condyloid hole* is very large. There are sometimes two condyloid foramina on one side, which are united into one.

The two tables of the cranium are in general less distinct in mammalia than in man, or appear to be more perfectly ossified; but in the *elephant*, the magnitude of the cranium depends in a great measure upon the separation of the two tables, between which are interposed a number of large cells of a very irregular figure, which are filled with air instead of medullary substance, and communicate with the Eustachian tube, and by that means with the external air. The cellular structure of the cranium in the *elephant* is similar to that found in the head of the *owl*, and designed in both to produce an increase of bulk, without an additional weight.

The bones of the face differ very much in this class, both in their forms and connections, from those of man, in consequence of the great prolongation of the jaws, and the lateral position of the eyes, in most mammalia.

The form of the upper jaw arises in a great degree from the presence of two bones, which are placed between the two ossa maxillaria. These have received different names, such as *intermaxillary* or *labial bones*; or frequently they are called the *os incisivum*, from the circumstance of their holding the incisor teeth, when they exist: they are called also *os palati*

palati by Blair, and *os maxillaire interieur* by Vitel. The intermaxillary bones have been confidered by fome anatomifts as forming a diftinction between all mammalia and man; but they have not been found in feveral fpecies of *monkey;* and Fifcher, who wrote a treatife on this fubject, ftates that he did not find an intermaxillary bone in the *three-toed floth*, and in the *horfe-fhoe bat;* but he admits that the bone might have been broken off, at leaft in the *floth*. Cuvier fays that the *floths* have very fmall intermaxillary bones. Vic d'Azir has afcribed thefe bones to the human fubject, confidering the fmall tranfverfe fiffure, feen within the incifor teeth of the human fœtus, as the future connecting the intermaxillary bones or bone with the upper jaw; but all other anatomifts deny the intermaxillary bones to man.

Thefe bones vary much in different fpecies, with refpect to form and fize. They are fmall in fome of the *digitigrade quadrupeds*, in the *rhinoceros*, and in the *walrus*; although Cuvier ftates them to be large in the *lamantin*. They are particularly large in the *faltigrada*, in which they make the whole front of the upper jaw, and contain the large upper gnawing teeth of thefe animals. They are large alfo in the *elephant*, *hippopotamus*, *porpoife*, and *phyfeter macrocephalus*. In the *ornithorhynchus* thefe bones exift, although there are no incifor teeth; and the form of the jaws is fo very peculiar, refembling in this animal the bill of a duck. The intermaxillary bones confift of two hook-fhaped pieces, united by a broad cartilage.

The *proper maxillary* bones contain ftill in mammalia the pofterior teeth of the upper jaw. Thefe bones contribute more than any other to the compofition of the face: even in the *monkey* tribe they begin to be prolonged, and affume fomething of the figure they poffefs in the true quadrupeds.

In the *cheiropterous*, *digitigrade*, *plantigrade*, and *pedimanous* mammalia, the nafal proceffes of the maxillary bones become fo broad as to feparate the orbits fufficiently, to give them a lateral pofition. The *faltigrada* have thefe bones carried fo far back by the great fize of the intermaxillary bones, that they form a confiderable portion of the orbit, the palatine bones having but little concern in the compofition of it.

The maxillary bones of the *floths* alfo extend to the orbits.

In the *ant-eaters* thefe bones are very long and narrow, refembling a portion of a cylinder; but they do not contribute to the formation of the orbits.

The maxillary bones of the *tapir* pafs backwards, and make the floor of the orbits: they alfo extend to the orbit in the *rhinoceros*.

In the *hippopotamus* thefe bones have no fhare in the orbit; they are very ftrong inferiorly, in order to accommodate the fuperior tufks, which are placed in them, and not the intermaxillary bones.

The *daman* has the inferior furface of the orbit formed by the fuperior maxilla: it makes a fmall part of it on the *ruminants*.

In the *lamantin* the maxillary bones conftitute the bafe of the orbit, and afterwards extend a confiderable way behind it.

In the *cetacea* they are much elongated, and reach to the very end of the flattened fnout of thefe animals: they afcend upon the fide of the blow-hole, and cover that part of the os frontis which forms the arch of the orbit.

The *malar bone*, in a great number of mammalia, is lefs in proportion than it is in man, and does not articulate with either the orbitar procefs of the os frontis or the fphenoides, but merely forms a part of the zygoma and the lower margin of the orbit. In thefe cafes, the frame of the orbit is incomplete at the pofterior part, and communicates with the foffa for lodging the temporal mufcle. It is thus with the *cheiroptera*, *digitigrada*, *plantigrada*, *faltigrada*, *pedimana*, *edentata*, and *multungulata*. In the *faltigrade* the os malæ is placed in the middle of the zygoma; the fuperior maxilla fupplying the anterior zygomatic procefs, in place of the malar. The temporal foffa is completely thrown into one cavity, in the *rhinoceros* and *elephant*.

The frame of the orbit is completed externally by the union of the malar and frontal bones; but there is an opening behind this from the orbit into the temporal foffa.

In the *folipeda* the malar and frontal bones unite by a procefs of the latter, which defcends on the outfide of the orbit, and furnifhes the margin of this cavity; but it is open behind into the temporal foffa, as in the *ruminants*.

The *nafal bones* are commonly prolonged, in proportion to the other parts of the face in mammalia. In fome of the *monkey* tribe they are united into one bone, which is very narrow. In the *long-prehenfile-tailed monkies* the interfpace between the orbits is very narrow, and pofteriorly merely forms a feptum.

Thefe bones are longeft in the true quadrupeds, and moft fo in the *faltigrada*, whofe external nares open immediately above the incifor teeth.

In the *hog*, the *tapir*, *hippopotamus*, and the *rhinoceros*, the nafal bones are not conjoined with the jaw at their anterior extremity, but form a diftinct procefs, which ftands out above the intermaxillary bone. This procefs fuftains the probofcis of the *tapir* and *hog*, and the horn of the *rhinoceros*, or the anterior one when there are two, as in the *bicornis*.

The procefs which fupports the trunk of the *elephant* is ftill more unlike the common nafal bones.

The nafal bones of *cetacea* are two fmall tubercles implanted in the os frontis.

The *lachrymal bone* is fometimes wanting, as in the *elephant:* in other inftances it is remarkably large, in the *ant-eater*, the *opoffum*, the *ruminating quadrupeds*, efpecially the *antilope*. It advances a little upon the cheek in the *flying lemur*.

According to Cuvier, the *ethmoid* bone has no fhare in forming the orbit in the *cheiroptera*, *digitigrada*, *plantigrada*, and *pedimana:* its place is fupplied by the orbitar procefs of the *palatine bones*, which are very large in thefe animals.

The *palatine bones* alfo conftitute, in the *long-nofed edentata*, the lower part of the furface of the depreffion correfponding to the orbit. The *pterygoid* proceffes alfo are produced by two laminæ, which are continued with the offa palati, and which, having joined each other inferiorly, prolong the canal of the nares to the foramen magnum of the occiput.

In the above defcription of the bones of the upper portion of the face, we have anticipated moft of the circumftances refpecting the *nafal* and *orbitar foffæ*.

It fhould be mentioned, that the *hog* has two fmall peculiar bones, fituated between the point of the offa nafi and the correfponding intermaxillary bones. Thefe ferve to ftrengthen the fnout, and are therefore called by Cuvier the *bones of the fnout*.

The *nafal foffæ*, although always opening nearer the front in quadrupeds than in man, are liable to vary with refpect to their fituation. In the *faltigrada* the external nares are quite at the end of the fnout, as already mentioned. In the *elephant*, the nafal foffæ are at about an equal diftance from the top of the cranium and the edge of the alveoli. In the *feal*, they are directed upwards. They are far forwards in the *morfe*. In the *cetacea*, the openings into the blow-hole, which

which correfpond with the nafal foffæ, are immediately before the os frontis, and open upwards and backwards.

We have already mentioned the figure of the margin of the orbit in feveral fpecies. In the *cetacea* there is a foffa correfponding to the orbit, although the eye of thefe animals is furrounded only by the foft parts. This foffa has a femicircular roof, formed by the os frontis; but it is quite open below, down to the lower jaw.

The *spheno-maxillary fiffure* is fhorter in all the *monkey* tribe than in man: it is contracted to the fhape of a hole in the *long-prehenfile-tailed monkies*, and is clofed altogether in the *howling baboon*. In the other mammalia, which have the orbitar and temporal foffæ united, it does not exift.

The *fub-orbitar foramen* is fingle in moft mammalia, as in man; but in fome there are two, or three, or more holes under the orbit; in which cafes they are fmall. There are, according to Cuvier, two in the *ourang-outang* and the *prehenfile-tailed monkies*, three in the *common monkies* and *Barbary ape*, four or five in the *ribbed-nofed ape* and *hair-lipped ape*. There are three or four holes in the *cetacea*. From the pofition of the orbits in thefe animals being fo low, the maxillary bones are above them, and contain the holes correfponding to the fub-orbitar.

The fub-orbitar foramina are large in moft of the *whifkered* quadrupeds, for the tranfmiffion of the great nerves that are diftributed to thofe parts. In the *cavy*, *agouti*, *porcupine*, and many of the *rat* tribe, they are prodigioufly wide; and in the *jerboa*, nearly equal in fize the orbits themfelves.

The greateft deviation from the human fubject, with refpect to the foramina of the face, is to be obferved in the *foramen incifivum*. This hole is fmall and fingle in the *ourang-outang* and *chimpanfee*, but enlarges a little in the other fpecies of *fimia*. There are two foramina very diftinct from each other in almoft all the other mammalia: they are remarkably large in the *faltigrade* and *cloven-hoofed* quadrupeds; in the *hare* they even exceed the extent of the folid part of the palate.

It is fingle and large in the *tapir*, *rhinoceros*, *horfe*, and *lamantin*; it is nearly obliterated in the *morfe*; fmall and far from the alveolar procefs of the jaw in the *dugong*; and wanting altogether in the *cetacea*.

Peculiarities of the *lower jaw* are to be found in its compofition, general form, direction of its afcending ramus, and the figure and relation of the condyloid and coronoid proceffes.

The inferior maxilla remains, during life, in two pieces, united by cartilage or ligament at the front, in moft mammalia. Thefe are anchylofed together, as in man, at an early period, in the *monkey* kind, the *vampyre*, and feveral other *bats*, the *phatageri* (*manis tetradactyla*), and the *elephant*. The two inferior maxillary bones are united into one very foon; alfo in the *many-hoofed* and *folid-footed quadrupeds*, and in the *morfe* and *lamantin*.

The general figure of the lower correfponds ufually with that of the upper jaw, already defcribed. In the *faltigrada* it is commonly a little fhorter than the upper jaw, on account of the inferior incifor teeth being fo long. In the *armadillo* and *four-toed manis*, the two fides of the jaw approach each other, and form a very acute angle at their fymphyfis.

The *ornithorhynchus* has the two pieces of the jaw joined to each other before their termination, and then bifurcate again In the *echidna* the extremities are again joined; they are thin, flat, and round, or fpoon-fhaped.

The lower jaw of the *elephant* is rounded in the front, and refembles the human jaw more than could be fuppofed, from the general outline of the head in each.

The *afcending ramus* of the lower jaw forms nearly a right angle with the body of that bone as in man, in the *lemur*, *cat*, *hedge-hog*, *fquirrel*, *hare*, *beaver*, *kanguroo*, and moft of the *faltigrada*, *rhinoceros*, *elephant*, &c.; in fine, in moft mammalia: but the mechanical operation of the jaw depends upon the fituation of the condyle on which this bone moves, and the coronoid procefs by which it is chiefly moved, with refpect to the body of the bone.

The *condyle* projects commonly back beyond the line of the angle formed by the body, and the afcending branch of the jaw. The more it is out of this line, or, in other words, the more the condyloid procefs approaches to the continuation of the body of the jaw, the more difadvantageous is the lever which this bone forms. The condyle, therefore, departs leaft from a right angle with the body of the bone in the *carnivorous* quadrupeds; a very little more in the *graminivorous*; and ftill more in the *monkey kind*. In the *ant-eater*, *manis*, *armadillo*, *ornithorhynchus*, and the *whale tribe*, the condyle does not form an angle, but is nearly in the fame line with the body of the jaw, thefe animals not having any afcending branch to the lower jaw.

The nature of the lever, and the force of the moving power, depend chiefly upon the fituation of the *coronoid* procefs, and the height and extent of this part.

This procefs is fmall in the *monkies*. In the *lemurs* and the *digitigrada* it is large, and paffes up into the temporal foffa, its point ftanding higher than the zygoma, and than the condyle, confequently the power of the temporal mufcle is diminifhed, but the difadvantage of the pofition of the coronoid procefs is more than counterbalanced by the enormous fize of the temporal mufcles in the *digitigrade* quadrupeds.

In the *faltigrada*, the coronoid procefs, in many inftances, is fhort, and fo far from the condyle, that it paffes before the pofterior grinding tooth, which is thereby placed between the moving power, and the point on which the jaw moves. The defign of the force of the temporal mufcle being carried fo far forwards in the *faltigrada*, is to increafe the power of the gnawing teeth. The *hare*, *fquirrel*, and *kanguroo*, however, have the coronoid procefs lefs advantageoufly fituated, but they do not employ their teeth, like the *rats* and the *beaver*, as mechanical inftruments.

In the *elephant*, the coronoid procefs advances upon the molar tooth, and paffes on the outfide of it as far as the one-third of the length of the tooth. It is a broad and very fhort procefs. In the *rhinoceros*, this procefs is at an equal diftance from the condyle and laft molar; and in the other animals of this order, it is generally nearer the back teeth than the condyle.

The *ruminating quadrupeds* have the coronoid procefs afcending into the temporal foffa, and its point paffing nearly into a line with the condyle.

The *folipeda* have it nearly the fame: its point is not fo far removed from the molar teeth.

In the *edentata* it is obferved to approach very nearly to the condyle in the *armadillo*. It is directed outwards, in place of upwards, in the *echidna* and the *ant-eaters*. In the *four-toed manis* it is not to be perceived.

There is a fhort coronoid procefs in the genus *delphinus*, and the true *whales*, which is directed backwards, and only forms the fuperior angle of the long triangle which each fide of the jaw prefents in thefe animals. There is no trace of the coronoid procefs in the *cachalots* (*phyfeter*.)

The kind of motion of which the lower jaw is fufceptible, is determined by the figure of the *condyles*, and the *cavities*, called *glenoid*, which receive them.

In the *carnivorous mammalia*, the condyle is longeft in the tranfverfe direction, and the glenoid cavity is adapted to it in fhape and fize: in many of thefe animals the articulation

 of

of the lower jaw forms a perfect hinge, and only permits the feparation of the lower from the upper jaw in the direction downwards. This is particularly to be obferved in the *badger*, where the glenoid cavity has a projection before and behind, by which the condyle is partially inclofed in the joint: it even remains fo after the parts are macerated, and the ligaments and cartilages are deftroyed.

In the *monkies*, the condyle is tranfverfe, and a little oblique: the glenoid cavity is wide and fhallow, and permits a degree of retraction, protrufion, and lateral motion of the lower jaw.

The freedom of motion in different directions is increafed in the other quadrupeds, and is moft fo in the *ruminating* and *gnawing* tribes. In the latter, the figure of the condyle is exactly oppofite to that of the *carnivorous* quadrupeds. It is a very thin oval tubercle, the length of which is from before backwards. The glenoid cavity is larger than the condyle, and fo little concave, that the jaw has a very free lateral motion.

In the *elephant*, the condyle is fhort and round: the glenoid cavity, in place of being concave, is elevated in the middle. There is another condyle formed by the bafe of the zygomatic procefs: a joint, thus conftructed, enables the animal to protrude and retract the jaw in a peculiar manner.

The glenoid cavity of the *hippopotamus* is fituated behind the zygomatic procefs, in fuch a way as would feem to prevent any protrufion of the jaw.

In the *rhinoceros*, although the furface of the glenoid cavity is nearly flat, it is bounded pofteriorly and internally by a long procefs, which muft reftrain its horizontal motion.

The articular cavity of the *tapir* has pofteriorly an oblique procefs which oppofes the lateral motion of the jaw.

The condyloid furface in the *ant-eater* is plane, and fituated at the pofterior extremities of the jaw. There is no glenoid cavity, but an articular furface correfponding to that of the jaw. In the other *edentata*, the condyle is a diftinct eminence, fmooth upon the furface, and applied to a fimilar furface of the zygomatic procefs, which fupplies the place of the glenoid cavity.

The condyle of the *cetacea* is round, and very little eminent. The furface correfponding to the glenoid cavity is adapted to the figure of the condyle; they are united together, not merely by ligaments externally, but the articulating furfaces furnifh many ligamentous bands, which confolidate the joint, and preclude every other motion of the jaw except that downwards.

The *os hyoides* of mammalia differs from that of the human fubject with refpect to the figure of the body of the bone, the relative magnitude of the cornua, and the exiftence of an additional offeous piece in place of the ftyloid ligament. This laft is found in all the genera, with the exception of the *monkey* tribe: it is ufually a long, flender bone, and is fometimes articulated in a particular depreffion fituated at the place correfponding to the ftyloid procefs of the os temporis. In other cafes it does not reach fo far as the cranium, but is connected to it by ligament or cartilage. The cornua, which are called the large, in the human fubject, are often confolidated with the body of the os hyoides, and thofe called the fmall cornua are fometimes very large. Cuvier has treated of all the varieties of the os hyoides, at great length, as he has of all the parts connected with the organs of deglutition or of voice. We fhall notice fome of the moft remarkable deviations in the conformation of the os hyoides, from its ftructure in the human fubject, and refer the reader to Cuvier's "Anatomie comparée" for details of the lefs important circumftances.

The os hyoides of the *ourang-outang* and *chimpanfee* refembles, almoft exactly, the fame bone in man. In the other *monkies*, the body of the bone is broader, and either fquare or triangular. In the *common monkies* with *long tails, not prehenfil*, the *hare-lipped monkey*, and the *baboon*, it is convex in the front, and forms a fort of cavity upon the internal furface.

In the *howling baboons* this bone is very remarkable: it forms a bony fac under the root of the tongue. The parietes of the fac are thin and very elaftic; they furnifh a number of thin projections interiorly, by which the fac is divided into feveral irregular fhaped apartments. This fac communicates pofteriorly by a canal with the larynx. It is, therefore, fubfervient to the functions of that part, and enables the animals that poffefs it to produce that loud cry for which they are fo diftinguifhed.

The os hyoides of the *digitigrada* is compofed, in general, of flender pieces: the body is cylindric, and nearly ftraight. The anterior cornua are longer than the pofterior: they are formed of two pieces; the fecond is fuftained by the ftyloid bone. This laft is ufually larger than all the other parts of the os hyoides; the end next the temporal bone is broad, and covered with an articular furface.

The os hyoides of the *opoffums* is flat, and nearly fquare: the cornua are joined to the angles: the large cornua are very broad at their bafe, and bent anteriorly, and end in a point: the fmall cornua are longer, cylindric in their form, and enlarged at the pofterior extremity.

In the *faltigrada*, the figure of the os hyoides and its branches vary in their fhape; in fome genera they are broad; in others, narrow and flender. The *beaver* has a ftrong long oval procefs defcending from the inferior edge of the body of the os hyoides. The anterior cornua are fmall and cartilaginous. Several of the other *faltigrada* have alfo a procefs or projection from the body of the bone.

The os hyoides has a peculiar ftructure in the *echidna hyftrix*. The body is formed of a flat, ftraight piece. The extremities of its anterior edge fuftain the anterior cornua, which are cylindric, directed forwards, and compofed of but one piece. The *ftyloid* bone defcends almoft perpendicularly to meet thefe cornua. The pofterior cornua are arched before: they are broad, flat, and articulated upon the fides of the body of the bone. The end of the pofterior edge is convex, and is attached to a fecond piece, which defcends parallel to the firft as far as behind the body of the os hyoides, where it is joined to the one of the oppofite fide. Two other pieces are added to thefe, about the place of their junction, and feparate from them upon the fides.

In many of the *multungulata* and *bifulca*, the pofterior cornua are confolidated with the body of the bone. In the *elephant* this bone has the figure of a flattened lamina, a little arched upwards. The pofterior branches are alfo flat, afcend obliquely backwards, and bend a little inwards. The ftyloid bone is bifid. Its pofterior branch is arched, long, and ends in a point. The anterior is ftraight, fhorter, and is articulated with the anterior cornna.

The os hyoides of the *cetacea* is both peculiarly fituated and formed. The ftyloid bone is long; it proceeds very obliquely forwards and inwards, under the bafe of the tongue, where it is joined to the anterior corner of the fame fide. The anterior cornua are fhort; they pafs directly backwards, to articulate with the middle of the convexity on the body of the bone: this laft is flat and anchylofed with the pofterior cornua, and reprefents the figure of a crefcent, the points of which are turned backwards, and are not attached by ligaments to the thyroid cartilage.

 The

MAMMALIA.

The number of vertebræ that compoſe the different regions of the ſpine of mammalia are ſubject to great variety, with the exception of thoſe of the neck, which are the ſame number in man and all mammalia, beſides the *three-toed ſloth*, which has nine cervical vertebræ. When the neck is remarkably ſhort, as in the *whale* tribe, the bodies of the cervical vertebræ are very thin, and a certain number of them conſolidated by anchyloſis into one bone, in which the diſtinctions of their original number and their proceſſes can barely be ſeen.

The following table of the number of the vertebræ in the other parts of the ſpine, beſides the cervical, is extracted from Cuvier's "Comparative Anatomy," and will render any further obſervations upon the numbers unneceſſary.

TABLE of the Number of Vertebræ in mammiferous Animals.

Species.	Dorſal Verteb.	Lumbar Verteb.	Sacral Verteb.	Caudal Verteb.
Man - - -	12	5	5	4
Ourang-outang - -	12	4	3	4
Jocko - - -	13	5	4	5
Long-armed ape -	14	3	6	0
Coaita or four-fingered monkey -	14	3	2	32
Weeping monkey -	14	7	4	25
Silky monkey - -	12	7	1	26
Red monkey - -	12	7	3	more than 16
Rib-noſed ape - -	12	7	1	13
Hare-lip monkey -	12	7	1	5
Chineſe monkey - -	11	7	3	20
Baboon - - -	12	7	1	31
Magot or Barbary ape	12	7	1	3
Mandril - - -	12	7	3	13
Pongo - - -	12	4	3	4
Howling baboon -	14	4	5	25
Maucauco - -	12	7	3	18
Lori - - -	15	9	1	9
Tarſier or woolly jerboa	14	5	3	more than 17
Vampyre or ternate bat	12	4	1	0
Common bat - -	11	5	4	12
Noctule or great bat -	12	7	3	6
Horſe-ſhoe bat - -	12	6	3	12
Flying lemur - -	12	6	1	22
Hedge-hog - -	15	7	4	12
Tanrec - - -	15	6	3	8
Shrew - - -	12	7	3	17
Mole - - -	13	6	7	11
White bear - -	13	6	7	11
Brown bear - -	14	6	5	more than 4
Badger - - -	15	5	3	16
Glutton - - -	16	5	3	18
Coati - - -	14	6	1	more than 10
Racoon - - -	14	7	3	20
Otter - - -	14	6	3	21
Martin - - -	14	6	3	18
Weaſel - - -	14	6	3	14
Civet - - -	13	6	3	20
Lion - - -	13	6	3	23
Tiger - - -	13	7	4	19
Panther - - -	13	7	3	24
Couguar or American lion - - -	13	7	3	22
Cat - - -	13	7	3	22
Dog - - -	13	6	3	22
Wolf - - -	13	7	3	19
Fox - - -	13	7	3	20
Hyæna - - -	16	4	2	more than 8
Cayenne opoſſum or crab eater - - -	13	6	5	more than 16
Marmoſe or murine opoſſum - - -	13	6	1	29
Phalanger or Surinam opoſſum - - -	13	6	1	30
Porcupine - -	14	5	4	more than 8
Hare - - -	12	7	4	20
Rabbit - - -	12	7	2	20
Cavy - - -	13	6	2	more than 4
Guinea-pig - -	13	6	4	more than 6
Paca or ſpotted cavy -	13	6	5	7
Agouti - - -	12	8	4	7
Beaver - - -	15	5	3	23
Flying ſquirrel - -	12	8	3	13
Marmot - - -	13	7	6	22
Field mouſe - -	13	7	3	15
Water rat - -	13	7	4	23
Black rat - -	13	7	3	26
Norway rat - -	13	7	4	23
Common mouſe - -	12	7	4	24
Field or harveſt rat -	12	7	3	23
Hamſter - -	13	6	4	15
Fat dormouſe - -	13	7	2	18
Garden dormouſe -	13	7	4	24
Ant-eater - -	16	2	4	40
Pangolin - - -	15	5	3	28
Long-tailed manis -	13	5	2	45
Armadillo - -	11	4	3	30
Two-toed ſloth - -	23	2	4	more than 7
Three-toed ſloth - -	14	4	3	13
Elephant - - -	20	3	4	24
Hog - - -	14	5	3	more than 4
Tapir - - -	20	4	3	12
Rhinoceros - -	19	3	4	22
Camel - - -	12	7	4	17
Dromedary - -	12	7	4	18
Stag - - -	13	6	3	11
Camelopard - -	14	5	4	18
Antilope - - -	13	6	5	15
Gazelle - - -	13	5	5	11
Chamois - - -	13	5	4	more than 7
Goat - - -	13	6	4	12
Sheep - - -	13	6	4	16
Ox - - -	13	6	4	16
Horſe - - -	18	6	2	17
Couaga - - -	18	6	7	18
Seal - - -	15	5	2	12
Dolphin - - -	13	In all 66		
Porpoiſe - - -	13			

The *cervical vertebræ* of the *monkey* tribe reſemble thoſe of the human ſubject, except that their ſpinous proceſſes are ſtronger and not forked. They are very long in the ſpecies of *baboon* called *pongo*, in conſequence of the large projecting face of this animal requiring an extenſive attachment for the muſcles, which raiſe and ſupport the head.

In the *digitigrada* the ſpinous proceſs of the ſecond vertebra is very high, and extends upwards, or rather forwards, upon the atlas, and backwards upon the third vertebra. The tranſverſe proceſſes of the atlas are very large and flat on the front and back. Theſe two vertebræ are altogether large. The pendent poſition of the head, in moſt of the *digitigrada*, makes the exiſtence of ſtrong muſcles neceſſary for its ſupport; the ligamentum nuchæ not being large in this family of quadrupeds. The ſhort muſcles at the back of the head contribute to the opening of the mouth of quadrupeds, and therefore ſhould be ſtrong in this carnivorous tribe.

The cervical vertebræ have no ſpinous proceſſes in the *mole* and *ſhrews*. They appear, eſpecially in the middle of the neck, as ſimple rings of bone, which admit of as free a motion upwards as in any other direction; their ligamentum nuchæ is oſſified in parts.

In the *ant-eaters* and *armadillos* the bodies of the laſt ſix cervical vertebræ are large and compreſſed. They are conſolidated to each other by anchyloſis. All the *edentata* have a gutter in the anterior part of the bodies of the cervical vertebræ, in which the œſophagus is placed.

In the *camel*, *camelopard*, and other quadrupeds with long and flexible necks, the ſpinous proceſſes are ſmall, or almoſt obliterated. In the ſhort-necked *ruminants*, as the *common cattle*, the tranſverſe proceſſes form two angles or double tranſverſe proceſſes. In both the *ruminants* and *ſolipeda* the bodies of the cervical vertebræ have a longitudinal ridge along their front.

The large quadrupeds, in conſequence of the great weight of their heads, have that peculiar elaſtic ſubſtance which is called ligamentum nuchæ of a great ſtrength. In the *horſe*, the attachment of this part to the dorſal vertebræ is two hands broad. It is alſo connected by proceſſes to ſome of the cervical vertebræ. In the *elephant* it is of an enormous ſize, and is inſerted into a foſſa at the back of the occipital bone.

In the *porpoiſe* and *dolphin*, the two firſt vertebræ are oſſified together. In the *grampus*, the firſt three or four are anchyloſed, and in the *cachalots* (*phyſeter*), the ſix laſt are united into one maſs, and the bodies of the five middle vertebræ are reduced to an extreme thinneſs.

The *dorſal vertebræ* want ſpinous proceſſes in ſome ſpecies of *bat*, and in others there are little tubercles in the place of the ſpinous proceſſes. In all this genus the canal for lodging the ſpinal marrow is very wide where it paſſes through the dorſal vertebræ.

In all the long-necked and heavy-headed quadrupeds, the ſpines of the dorſal vertebræ are remarkably large and long, particularly in the *elephant*, *camel*, *camelopard*, and *horſe*. The ſize of the ſpinous proceſſes in theſe animals is neceſſary for the attachment of the ligamentum nuchæ.

The dorſal vertebræ of the *whale tribe* have at firſt the articular proceſſes at the root of the tranſverſe, but towards the ninth vertebra there are only the ſuperior ones; for at this diſtance theſe articular proceſſes turn backwards to the baſe of the ſpinous proceſſes next the head, and form a kind of groove, which receives the preceding ſpinous proceſs.

In the *lumbar vertebræ* there is great variety with reſpect to number, as is ſhewn by the foregoing table. When a quadruped is diſtinguiſhed by a long body, it is uſually found to be occaſioned by the number of the vertebræ of the loins. The ſpinous proceſſes are long in the *dog* and *cat* genera, and have an inclination towards the head. This likewiſe takes place in ſome degree in the *monkey* kind.

The motion of the lumbar vertebræ is more or leſs reſtrained in moſt quadrupeds, by the external ſide of each poſterior articular proceſs having a point directed backward, ſo that the anterior articular proceſs of the next vertebræ is received between two prominences.

The tranſverſe proceſſes are very large in the *ox*, *horſe*, &c.; but are particularly ſo in the *whale* tribe, for the purpoſe of affording a ſurface for the attachment of the great muſcles which move the tail, and give theſe animals the figure of fiſhes. There is a gradual change of form and ſize in the vertebræ of the poſterior portion of the ſpine in the *cetacea*, but no marked diſtinction into the lumbar, ſacral, and caudal vertebræ.

The breadth of the *ſacrum* in man evidently ariſes from the erect poſition of his body. The few mammalia that occaſionally ſtand upon the poſterior extremities, as the *monkies* and *bear*, have it broader than quadrupeds in general. In theſe laſt it is an elongated triangle, and is the continuation of the ſpine. This bone has large lateral proceſſes at its anterior extremity in the *horſe*.

The ſpinous proceſſes are uſually more eminent upon the ſacrum in quadrupeds, than in man or the *monkey*. They nearly join to form a high ſharp ridge in the *rhinoceros*, and many of the *biſulca*. This creſt is very remarkable in the *mole*.

The *vampyre bat* is the only example in mammalia of a total want of *tail* or *caudal vertebræ*. The ſacrum of this animal terminates in a long point.

The *vertebræ of the tail* are uſually very numerous in mammalia. Thoſe next the ſacrum have the ſame proceſſes as the vertebræ of the other portions of the ſpine, and alſo a canal for holding the medulla ſpinalis. The vertebræ towards the extremity of the tail want the ſpinal canal, and have only ſmall eminences or tubercles in place of the tranſverſe or ſpinous proceſſes. Thoſe animals that employ their tail in ſwimming, as the *cetacea*; in building, as the *beaver*; or for progreſſion by leaping, as the *kanguroo*, have the proceſſes of the caudal vertebræ large and ſtrong. The *beaver* has the breadth of the tail increaſed by the ſize of the tranſverſe proceſſes, and has alſo inferior ſpinous proceſſes, which are larger than the ſuperior, for the purpoſe of giving attachment to the great muſcles by which this animal's tail is ſo forcibly depreſſed. The tranſverſe proceſſes only diſappear very near the extremity of the tail in the *cetacea*.

In thoſe quadrupeds that make much uſe of the tail, there is generally found a ſeries of ſmall double bones upon the under ſurface of the joints of the vertebræ, from the third or fourth to the ſeventh or eighth. In the *cetacea* they are very remarkable, and deſigned to perform the ſame offices as the inferior ſpinous proceſſes of fiſhes' tails. They are ſometimes anchyloſed in pairs; but, generally, their edges touch, and each pair forms a ſort of inverted Gothic arch ſomewhat ſimilar to the inferior caudal ſpines of fiſhes.

Thoſe that have prehenſile tails, as one diviſion of *monkies*, have upon the inferior ſurface, and at the baſe of each body of the caudal vertebræ, two little tubercles, between which the flexor muſcles of the tail paſs.

The *ribs* of mammalia, both the true and the falſe, are very various with reſpect to number. They appear, however, to be not fewer in any inſtance than twelve, the number found in the human ſubject: as will appear by the following table, extracted from Cuvier's "Comparative Anatomy."

Table of the Number of Ribs in mammiferous Animals.

Species.	Total.	True.	Falſe.
Man	12	7	5
Sai, or weeping monkey	13	9	4
Ourang	12	7	5
Pongo	12	7	5
Ternate bat	13	7	6
Common bat	12	7	5
Mole	13	8	5
Hedge-hog	15	7	8
Bear	14	9	5
Seal	15	10	5
Glutton	14	9	5
Racoon	14	9	5
Otter	14	9	5
Lion	13	9	4
Cat	13	9	4
Wolf	13	9	4
Opoſſum	13	7	6
Hare	12	7	5
Guinea-pig	13	6	7
Three-toed ſloth	16	8	8
Long-tailed manis	13	6	7
Elephant	20	7	13
Hog	14	7	7
Rhinoceros	19	7	12
Dromedary	12	7	5
Camelopard	14	8	6
Ox	13	8	5
Stag	13	8	5
Horſe	18	8	10
Dolphin	13	6	7
Porpoiſe	13	6	7

The ribs are thick and broad in the large herbivorous quadrupeds, which are employed as beaſts of labour; the ſtrength of the ſpine, and its capability of ſuſtaining great weights, depending very much upon the ſize of the ribs, and the figure they give to the trunk of the body.

In all the quadrupeds that protect themſelves by rolling the head and extremities under the belly, when attacked by other animals, the ribs are remarkably ſtrong, and cloſely ſet together. This conformation is to be obſerved in the *common hedge-hog*, but much more in ſome of the *edentata*, as the *armadillo* and the *ant-eaters*. The two firſt ribs of the *armadillo* are exceſſively large in proportion to the others, and in the *two-toed ant-eater* the ribs are ſo broad, that they overlap or reſt upon each other, which gives this animal a greater ſecurity than it could derive from having the parietes of the thorax formed of one piece of bone.

The ribs of the *ornithorhynchus paradoxus* and *echidna hyſtrix* are curiouſly formed. The ſix true ribs are each compoſed of two pieces united by an intermediate cartilage, like the ribs of birds: the piece connected with the ſpine is longer than the other. The falſe ribs of theſe animals terminate in broad, flattened, oval plates, which are connected together by elaſtic ligaments.

The ribs have leſs curvature upon their ſides in thoſe quadrupeds that want clavicles than in the others. Thoſe with clavicles have a cheſt ſhaped more nearly like the human, but in the quadrupeds which never uſe the anterior extremity as a prehenſile member, the cheſt is flattened or narrowed upon the ſides, eſpecially towards the ſternum. The *cetacea*, however, notwithſtanding they have no clavicles, have a cylindric thorax, or one rather wider from ſide to ſide, than from above downwards.

The *ſternum* in mammalia differs from the human generally in being longer in proportion to the body, being a rounder and narrower bone, and compoſed of a greater number of pieces.

The *ourang-outang* and the *pongo* have a flat broad ſternum like man, but in all the other *monkies* it is narrow, and compoſed of ſeven or eight bones.

In moſt quadrupeds it projects a little forwards beyond the line of the firſt rib, but in the *mole* this projection is very extraordinary; it paſſes forwards for almoſt as great a diſtance as the bone makes a part of the cheſt. This anterior portion is compreſſed upon the ſides; is like a ploughſhare, and ſuſtains upon its ſides the clavicles: by this ſtructure the anterior extremities of the *mole* are carried forwards under the neck, occaſioning the appearance of a want of neck, and the animal is enabled to excavate the earth for the admiſſion of its body by the fore feet with extraordinary rapidity.

The anterior end of the ſternum is curiouſly formed in the *bats*; it is enlarged into the figure of a T, the ſuperior branches of which paſs over the ribs and are joined to the clavicles.

The *hog* has the ſternum narrow anteriorly, and large behind.

In the *cetacea*, the ſternum is ſhort, thin, and even broader in proportion to its other dimenſions, than in man.

The *clavicle* is a bone required for the motions of the anterior extremity in the outward or inward direction. It exiſts neceſſarily, therefore, in all animals that employ the arm as a prehenſile or mechanical member, or as a wing. There is a perfect clavicle in all the *monkey* tribe, the *cheiroptera*, the *opoſſum* family: in the *mole*, *ſhrews*, and *hedgehogs*, amongſt the *plantigrada*: in the *ſquirrels*, *rats*, *beaver*, *porcupine*, and *kanguroo*: in the *armadillos* and *ant-eaters*: in the *ſloths*, &c.

The *digitigrada*, and ſome of the *ſaltigrada*, have an imperfect clavicle, (*os claviculare* of Vic d'Azir.) This is a ſhort bone ſuſpended merely by the muſcles, and not attached either to the ſternum or the ſcapula.

The clavicle is entirely wanting in the quadrupeds which employ their anterior extremities for progreſſive motion, as all the *hoofed* quadrupeds, the *daman*, the *cavy*, the *pangolins*, and in all the *cetaceous* tribe.

The clavicles of the *ourang-outang* reſemble thoſe of the human ſubject.

In the *bat*, they are remarkably long and ſtrong.

The clavicle has an extraordinary thickneſs in the *mole*. It is nearly ſquare, being more broad than it is long.

In the *two-toed ant-eater*, this bone has the figure of a rib.

In the *ſloths*, the clavicle has a proceſs from the extremity next the ſternum, which forms nearly a right angle with the axis of the bone.

The *ſcapula* exiſts in all mammalia, but its poſterior angle is moſt elongated in thoſe ſpecies which have the moſt complicated motions of the anterior limbs or the arms.

It is in the *monkies* and *lemurs* a triangular bone, of which the inferior or poſterior edge, and that next the ſpine, are larger than the anterior ſide, but not ſo much larger as they are in man.

The *cheiroptera* or *flying mammalia*, have the edge of the ſcapula next the ſpine very long, and the poſterior very acute.

The body of the ſcapula in the *hedge-hog* is narrow, and the edge next the ſpine not extenſive, but the whole is conſiderably elongated.

In

In the *mole*, the ſcapula is a long narrow bone, which does not exhibit the diſtinction of ſupra-ſpinous and infra-ſpinous ſurfaces upon the back; there being no ſpine except near the poſterior margin, and before the tubercle which correſponds to the acromion. The ſcapula of the *mole* lies parallel to the vertebræ, and reſembles a good deal both in form and poſition the ſame bone in *birds*.

In quadruped, generally, the edge of the ſcapula next the ſpine is rounded, and the poſterior angle thus rendered blunt. The ſpinous proceſs of the bone is ſituated about the middle of the body, or even lower.

In thoſe quadrupeds that want clavicles, the acromion ſcapulæ is not ſo prominent as when theſe bones exiſt, and there is another proceſs which points backwards almoſt perpendicular to the ſpine. This proceſs is alſo found in the *hedge-hog* and *opoſſums* which have clavicles. In the *hare* the recurrent proceſs is very long.

The coracoid proceſs of the ſcapula is commonly wanting in thoſe that have only the rudiments of clavicles, and more conſtantly where theſe bones do not exiſt.

In the *ruminants* and *ſolid-footed* quadrupeds, the ſcapula has neither acromion, coracoid, nor recurrent proceſs.

The *cetacea* have a thin flat ſcapula. The edge next the vertebræ is round and broad, ſo that the whole bone has much the figure of a ſaw. In the genus *delphinus* the ſpinous proceſs is near the cervical edge of the bone, and does not form an angle with the infraſpinous ſurface, of which it ſeems the continuation. The ſupraſpinous foſſa has a deep concavity, which appears to ariſe from a deficiency in oſſification. Above the humeral angle, there is a projecting plate continuous with the ſpinous proceſs, which appears to correſpond with the acromion. In the other genera of the *whale* tribe, the ſupraſpinous foſſa is ſtated by Cuvier as being leſs diſtinct.

The *humerus* of mammalia varies in length and thickneſs, and in the elevation of its proceſſes.

This bone is longer in the *bat* and the *tardigrade* quadrupeds, in proportion to the reſt of the anterior extremity, than the humerus of the human ſubject. In quadrupeds, generally, however, it is much ſhorter. Thoſe that have the metacarpal bones long, have the humerus ſo ſhort, that it is concealed in a great meaſure by the muſcles of the limb and the ſkin of the thorax, from whence the ancient anatomiſts fell into the error of ſuppoſing, that the elbow was turned forwards in quadrupeds, the joint of the carpus being miſtaken for that of the elbow. It is cuſtomary with people ignorant of comparative anatomy, ſtill to miſcall the part correſponding to the waiſt in quadrupeds the elbow.

This bone is alſo very ſhort in the *cetacea*, and has a large ſpherical head.

The ſhorteſt humerus, and the thickeſt with reſpect to its length, is found in the *mole*, which animal is diſtinguiſhed by many peculiarities in its ſkeleton. It has beſides a very ſingular form. The two ends of the bone are ſo much expanded and changed from the uſual appearance of theſe parts, that they are with difficulty recognized. There is a ſmall proceſs which takes the place of the head of the bone, and is articulated with the ſcapula. There is another articular ſurface, apparently correſponding to the great tuberoſity, which alſo forms a joint with the clavicle: between theſe two the top of the humerus is deeply hollowed. The creſt of the little tuberoſity is ſo large, that it reſembles a ſquare placed vertically, with the linea aſpera at top. The body of the bone is bent towards the top, ſo that the part which forms the joint with the ulna points directly upwards; by which means the elbow of this animal ſtands above the ſhoulder, and the palm of the hand is turned outwards. This formation of the arm enables the *mole* to throw the earth to each ſide when it buries itſelf.

The humerus of the *beaver* is conſiderably enlarged at the condyles. It has alſo a large tranſverſe proceſs, at about the diſtance of one-third from the top.

In the *hog*, *tapir*, and *rhinoceros*, the humerus has the great tuberoſity divided into two parts. The linea aſpera alſo of the *rhinoceros* terminates in a very high tubercle. Something ſimilar exiſts in the *horſe*.

The *biſulca* generally have the great tuberoſity very high, and the linea aſpera prominent.

In moſt quadrupeds, the great tuberoſity is elevated above the head of the humerus.

In thoſe mammalia that employ the upper extremity for other purpoſes than walking, the *bones of the fore-arm* exiſt diſtinctly, and preſerve nearly their proper proportions, as in man. But in the true quadrupeds, the *ulna* declines in ſize, and becomes in ſome a mere appendage to the *radius*, which is the principal bone of the fore-arm in moſt quadrupeds. The exiſtence of two bones in the fore-arm is only neceſſary on account of the motion of ſupination. Where the ſupine ſtate of the member would be inconvenient in the progreſſion of the animal, we find the ulna either anchyloſed to the radius, or entirely abſent.

The *ulna* in the *ourang-outang* reſembles that of man In the *monkey tribe*, generally, the coronoid proceſs of the ulna is narrower, and the bone is more compreſſed than in man. The articular ſurface of the radius alſo is deeper. There is often a hole found in the cavity at the back of the humerus, which receives the olecranon.

In the *digitigrada*, the olecranon is compreſſed, and projects more backwards; and the coronoid proceſs is diminiſhed before. In the *dog* there is a little cavity in the end of the radius, for the reception of the external proceſs, or leſſer head of the humerus, and a ridge for the furrow that divides it from the anterior part of the pulley, by which the rotation of the radius is a good deal reſtrained.

In ſome of the *ſaltigrada*, as the *cavy*, the *hare*, the *rat*, and others, the coronoid proceſs of the ulna is entirely obliterated, and the radius covers the front of the articulation. The head of the latter bone forms a hinge-like joint, having a cavity for the leſſer head of the outſide of the humerus, and a ridge for the anterior part of the pulley, that is occupied in man by the coronoid proceſs of the ulna.

In the *rhinoceros*, the *tapir*, and *hog*, the ulna is entirely behind the radius. They move as one bone upon the pulley of the humerus. The leſſer head of the latter bone is quite effaced inferiorly. The ulna and radius of theſe animals are notwithſtanding diſtinct, but ſtill are incapable of rotation.

In the *elephant*, the coronoid proceſs is divided into two ridges with hollow ſurfaces, which revolve upon the projecting parts of a ſingle hinge. Between theſe the head of the radius is placed. It is ſmall, and ſuſtained by the external ridge, and the middle channel of the hinge or pulley: for as it is oblong, it cannot turn upon it. The lower part of the radius is directed towards the inner ſide of the leg, which is therefore always in the pronated poſition. The inferior head of the ulna is larger than that of the radius, which Cuvier ſays does not occur in any other animal in this whole claſs.

In the *cloven* and *ſolid-footed* quadrupeds, the ulna is united immoveably to the radius almoſt throughout its whole length. This union is oſſeous after a certain period, ſo that they might be conſidered as one bone. They form together a hinge-like joint, with the pulley on the end of the humerus, which does not admit of any rotatory movement.

Where the anchyloſis is incomplete of the two bones in theſe

these animals, there is a short fissure to be seen between them. This exists above and below in the *camelopard*, *stag*, and *gazelle*: only at the upper part of the bones in the *horse*, *sheep*, and *ox*, and is not perceived in the *camel* and *dromedary*; but in all these animals the original distinction between these bones is marked by a furrow or groove.

All the hoofed quadrupeds have the anterior extremities permanently in the state of pronation; that is, with what is called the back of the wrist turned forwards.

In the *bat* and *galeopithecus*, there is only one bone in the fore-arm, or at least a mere styliform rudiment of the other. This single bone Blumenbach has called the ulna, and Cuvier the radius. The latter is certainly the proper appellation. The motions of the anterior extremity, as a wing, require the part corresponding to the fore-arm to be constantly in a state of pronation.

In the *mole*, the olecranon is very long, and terminates in a transverse plate: the whole ulna is very thin. The edge of the head of the radius is prolonged under the little head of the humerus, and seems to be incapable of rotation. The position of the fore-arm and hand of the *mole* is singular. The elbow, as before observed, is turned upwards; the palm of the hand outwards, and the thumb downwards. This is pronation carried to an extreme, which is the most suitable position of the hand for its peculiar office in this animal of scooping out the earth.

The *seal*, instead of the concavity for surrounding the pulley of the humerus, has upon the ulna one surface, which forms a joint with the humerus, and another oblique one for the radius. This last has a large head, the inner edge of which runs in a pulley. The body of the radius is very broad downwards.

In the *lamantin*, the radius and ulna are anchylosed together at both ends.

In the *cetacea*, the bones of the fore-arm are placed close to each other, but not united by ossific substance: they are flattened, and connected so intimately with the humerus and the carpus by ligaments and cartilage, that they have none of the motions of a regular articulation. They merely admit of a degree of flexion, forwards and backwards, sufficient to communicate the necessary pliancy to the fin.

The number and the figure of the bones composing the *carpus* differ from what we find in the human subject, and amongst the different tribes of mammalia themselves.

In the *monkey tribe* there are nine bones in the *carpus*, which is one more than in man. According to Tyson, however, there are but eight in the *ourang-outang*. The *pisiform bone* of these animals is elongated, and appears like a heel when they walk upon all fours, or use the anterior extremities as feet. Certain ossified points of the tendons passing into the hand, have been mistaken for supernumerary bones in the *monkey* kind.

The *flying squirrel* is mentioned by Blumenbach as possessing a very curious sharp-pointed bone on the outer part of the carpus, connected to that part by two small round bones, and inclosed in the lateral expansion of the integuments.

In many *carnivorous* quadrupeds, the *scaphoides* and *lunare* are united into one. The *cat* has at the radial edge of the carpus a little supernumerary bone, similar in figure to the *pisiform* bone of the human subject. The real *os pisiforme* of the *digitigrade* is long, and serves as a sort of heel to the fore-feet. The *os magnum* is very small towards the back of the carpus. Those that have the thumb imperfect have also the *trapezium* much diminished. The *ursus gulo* has this bone also small, and a style-shaped process below the *os scaphoides*.

The *mole* has nine bones in the carpus, and an additional bone which resembles the blade of a scythe in its figure. It descends on the radial side of the hand, the surface of which it is designed to extend, in order to fit it for shovelling back the earth when this animal burrows.

Amongst the *saltigrada*, the *hare* has nine carpal bones. The *beaver*, *marmot*, *squirrel*, and *rat tribe* have the scaphoid and lunar bones formed into one. These animals likewise have, like the *digitigrada*, a supernumerary bone, which is often larger than the pisiform. In the *jerboa* and *marmot*, it bears upon it another supernumerary bone. In the *porcupine* there is an additional carpal bone, attached to the os unciforme, between the os pisiforme and the metacarpal bone of the small toe. The *cavy* and *guinea-pig* have one bone for the scaphoid and lunar; and the latter animal has a small supernumerary carpal bone.

The *two-toed ant-eater* has six bones in the carpus. There are seven in the *pangolin*. There are eight found in the *nine-banded armadillo*.

The *three-toed sloth* has but five carpal bones.

The *elephant* has eight bones. The os pisiforme is lengthened, and the other bones of a wedge shape.

In the *rhinoceros* the trapezium does not exist, but there are two supernumerary bones; one on the edge of the scaphoides, and the other upon the os unciforme.

In the other *many-hoofed* quadrupeds the trapezium is very small.

In the *cloven* and *solid-footed* quadrupeds the carpal bones are narrow. The first tribe have, in general, four bones in the first row, and two in the second. The *solipeda* have four in the first and three in the second row.

In the *cetacea* the bones of the carpus are flat-shaped, and intimately united to each other by cartilage and ligament. We have found the carpus of the *grampus* to contain a greater proportion of cartilaginous substance than of osseous, the bones appearing like spots of ossification in the centres of masses of cartilage. The surface of the carpus in *cetacea* is smooth on both sides. There are five carpal bones, three in the first row and two in the second.

The *metacarpus* consists of the same number of bones as the fingers, (or, as they are more commonly called, toes, in quadrupeds,) perhaps without exception; it being understood, that the *pollex* is not reckoned amongst the number of fingers, for it is a question amongst anatomists, whether the first joint of the thumb, in the human subject, should be considered as a metacarpal bone, or as a real phalanx. We believe it is the latter, which opinion seems to be supported not only by analogy of structure in mammalia, but in birds.

The *cloven* and *solid-hoofed* quadrupeds have been cited as giving examples of a difference in the number of the metacarpal bones and the digiti. This difference, however, is more apparent than real. The *cloven-hoofed* have, it is true, but one bone in the metacarpus after a certain age, which is called the *cannon* bone (*gamba* of Vegetius), but this bone is originally composed of two parallel pieces, which are formed into one by a curious process. The two sides of the pieces that are applied to each other are rendered thinner by being absorbed: these are next portions of the sides removed, leaving holes between the cavities of the two pieces; and ultimately the sides in contact disappear, forming a common medullary cavity, and a single bone, which remains grooved at the line of the junction of its original parts.

The *cannon bone* of the *solipeda* is composed of three pieces; the two lateral are slender and styliform, and are called, very appropriately, the *splent* bones. These have been considered analogous to the metacarpal bones of digiti which do not exist,

exiſt, but they ſhould rather, perhaps, be viewed as the rudiments of both metacarpal bones and digiti. In other caſes where there are veſtiges of digiti, they appear as ſtyliform bones.

The length of the metacarpal bones depends upon the offices of the anterior extremity. When it is employed ſolely for progreſſion, as in the true quadrupeds, the metacarpus is very long, but when uſed as a prehenſile member, this part is proportionally ſhort.

Cuvier ſtates, that in the *three-toed ſloth* there are three metacarpal bones united into one at their baſe, and that there is a rudiment of a fourth bone added to them.

The metacarpal bones of *cetacea*, from contributing to the formation of a fin, are much flattened.

The *digiti* of the *quadrumanous* mammalia, and all thoſe with claws, are five in number. In the firſt, the pollex is free in its motions, and capable of being brought oppoſite to the other fingers, which conſtitutes one of their moſt ſtriking reſemblances to man.

Even in the *monkey tribe*, however, the thumb is ſhorter and ſmaller, in proportion to the other fingers, than the thumb of the human ſubject; and a particular ſpecies of *monkey*, the *ſimia paniſcus*, has it imperfect, and concealed beneath the ſkin.

The *digitigrada* have the thumb parallel to the reſt of the toes: in many it is ſhort, and in the *hyæna* it is nearly obliterated, conſiſting only of one phalanx. In the *cat* genus, there is a peculiar ſtructure of the two laſt phalanges, by which the claws are thrown upwards in the extended ſtate of the toes. The deſign of this appears to be, to avoid the blunting of the claws againſt the ground. The laſt phalanx but one is three-ſided, having an inferior and two lateral ſurfaces; that on the inſide appears in ſome degree twiſted and hollowed out. The phalanx, which is terminated by the claw, is, of courſe, hooked at the end, but at its baſe, nearer the root of the claw, in a ſort of hood or ſheath. The poſterior part of the phalanx riſes almoſt vertically, and is only articulated at its moſt inferior part. Beneath the joint there are two appendices, in which the muſcles which bend the phalanx are inſerted. Theſe alſo bring the point of the claw forwards and downwards. The ſame muſcular power which puts the toes into a flex poſition, thus ſerves alſo to urge downwards the points of the claws into the prey of theſe animals. When the claws are retracted, the laſt phalanx is received by the lateral depreſſion on the radial ſide of the ſecond.

The *pollex* is ſhort in the *hare*, *beaver*, and *jerboa*. It is more diminiſhed in the *ſquirrel*, *rat*, *porcupine*, *paca*, and *agouti*. It is nearly loſt in the *cavy*, *marmot*, *guinea-pig*, &c.

Amongſt the *edentata* the thumb is obliterated in the *great* and the *four-toed ant-eaters*.

Both it and the little toe are loſt in the *three-toed ſloth*. In this animal the three perfect toes are often incorporated at their roots with the metacarpus. When they form a joint with the metacarpal bones, it is ſuch a one as does not permit any lateral motion. The phalanges themſelves likewiſe are articulated with each other by hinge-like ſurfaces, which only admit of flexion and extenſion. Another peculiarity of the hand of this animal is, the laſt phalanx being the longeſt.

In the *two-toed ant-eater* and *two-toed ſloth*, the thumb, fore, and little finger are the different parts.

The *multungulata* have either four or five toes. In the *elephant* there are five perfect, but they are nearly enveloped in the ſkin of the foot. There are but three perfect in the *rhinoceros*. The *hog* has but two perfect and two imperfect.

The *tapir* and *hippopotamus* have four perfect, and the rudiment of a thumb.

The *cloven-hoofed* have two perfect, and in ſome two imperfect toes.

The *ſolid-hoofed* have one perfect and two imperfect.

By imperfect toes, or digiti, are meant thoſe little horny excreſcences which do not reach the ground, but are placed at the back, and are ſometimes covered with nails or hoofs, and contain under the ſkin the proper bones of a toe.

The moſt remarkable deviations from the uſual ſtructure are found in the flying and aquatic mammalia. The very extenſive wings of the *bat* are ſupported upon the elongated phalanges of the four fingers, the thumb being ſhort, and armed with a hooked nail at the extremity.

In the *ſeal* and *lamantin* the fingers are elongated a good deal, and ſpread out, that the hand may the better perform the office of an oar. In the *cetacea* the digiti are rather elongated, and are much flattened. They are conjoined with the metacarpus and each other by cartilaginous ſurfaces, that do not permit any motion beyond the gentle waving one of the fin, in which they are concealed. The digiti are cloſe together at their baſes, but ſpread a little aſunder towards their extremities; but they are all bound together by means of the ligamentous ſubſtance which ſupports and ſtrengthens the different parts of the fin.

The *oſſa innominata* are more elongated and narrow in mammalia generally than in man. They do not in any inſtance form a baſon-ſhaped cavity, like the human pelvis. In many quadrupeds, the cavity of the oſſa innominata wants the diſtinction of the large and ſmall pelvis, and is placed in the direction of the ſpine; and in ſome this cavity looks obliquely upwards, that is to ſay, backwards, if we were ſpeaking of the human ſubject.

The *monkey* and *bear* moſt nearly reſemble man with reſpect to the form of the pelvis, but even they have the oſſa ilii elongated, and the cavity of the pelvis much narrower than in man, and not opening ſo much forwards. Thoſe *monkies* that have the calloſities on the buttocks, have the *tuberoſities* of the *iſchium* very large, and ſpread out.

In the *vampyre bat*, the tuberoſities of the iſchium and the extremity of the ſacrum are conſolidated together by anchyloſis, of which there is no other example in this whole claſs. The pelvic bones are leſs elongated in the *bats*, generally, than in quadrupeds.

The *digitigrada* have the abdominal ſurfaces of the ileum turned towards the ſpine, and ſo much narrowed, that the dorſum of the bone is not larger than the neck. The concavity is alſo upon the external ſurface. The criſta of the ileum is ſo ſhort, that it bears no reſemblance to that part in the human ſubject. The form of the pelvic bones is nearly ſimilar in the *plantigrade* and *ſaltigrade* quadrupeds, with ſome exceptions. In the *mole*, the oſſa innominata are nearly cylindric; they are long, and lie almoſt cloſe to the ſpine: the cavity of the pelvis is ſo very narrow, that it can only receive the rectum, the organs of generation and bladder being placed externally to it. The *beaver* and *kanguroo* have the oſſa pubis not united by cartilage, but are anchyloſed together.

In the *opoſſum* tribe and the *kanguroo*, the brim of the pelvis has but little extent, and there are two additional bones, the uſe of which is to ſupport the abdominal pouch. Theſe bones ſtand up from the edge of the pubis on each ſide of the ſymphyſis. They are, at leaſt in the *kanguroo*, of an elongated, tapering figure. They are connected with

the

the pubis by ligament, which allows the free extremities of the bones to be moved up and down upon the belly. Thefe bones exift alfo in the *ornithorhynchus*.

The *tardigrada* have the *offa ilii* broad, with a large circular *pubis*. The opening of their pelvis is, therefore, very wide, and but little oblique. In thefe animals, and the *armadillo*, *pangolin*, and *ant-eaters*, the tuber ifchii is placed near the facrum, and in fome cafes they are even offified together. In the *ant-eaters*, the *offa pubis* have no fymphyfis, but are feparate from each other, in which circumftance they refemble the bones of the pubis in birds. It is worthy of remark, that we difcern the moft frequent analogies of ftructure between the toothlefs tribe of mammalia, and the other claffes of animals.

In the *ruminating* quadrupeds the furface of the ileum, which in the human fubject is internal and anterior, has a contrary afpect, being turned towards the fpine. The ifchiatic notch excavates the ileum deeply. In the *ox*, *buffalo*, and other ftrong-backed *ruminants*, the anterior part of the ileum is very large. The fpine of this bone, and the tuberofity of the ifchium, are difcernible under the integuments, and produce that rugged outline of the rump of cattle.

The dorfum of the ileum is very large in the *horfe*, as in fome of the *ruminants*, and the neck of the bone is very fhort: in both, the external furface of the ileum is concave.

In the *elephant*, the furface of the ileum next the belly is hollowed; the crifta is round: both the anterior portion of this bone, and that which unites with the ifchium, are very large, and the latter moft fo. The *rhinoceros* has a fimilar pelvis, but the pofterior branch of the ileum is lefs in proportion.

There is a fimilitude in the pelves of the fwimming quadrupeds, as the *feal*, *otter*, &c. they are long and narrow.

In the *cetacea* there are two bones on each fide of the anus. They are conjoined by cartilage before that aperture. Thefe bones have a good deal the figure of two flat fhort horns united at their root. The ends of the horns are directed towards the fpine, and correfpond to the offa ilii: near the root there are two fmall conical projections which fupply the place of the ifchium of each fide, and the conjoined parts of thefe bones reprefent the pubis. Thefe bones are fufpended in the flefh, and have no connection with the fpinal column, and do not form any cavity; they, therefore, properly do not conftitute a pelvis. Their ufe is to give attachment to the penis and clitoris, and fome of the mufcles of thefe parts. Cuvier ftates, that the pelvic bones of *cetacea* are not united to each other, but we have found them as above defcribed in the *grampus*.

The *os femoris*, in the *monkey* tribe, refembles the fame bone in man. It, however, is fmoother and rounder, having fcarcely any *linea afpera* upon it.

In quadrupeds, generally, the femur has a fhorter neck, and the great *trochanter* is lefs eminent, and the bone altogether is fhorter in proportion to the other parts than in man. The femur is particularly fhort in the quadrupeds that have a long metatarfus, as the *cattle* and the *horfe*. In thefe the bone is enveloped fo much by the flefh of the buttock, that the part which is really the leg is commonly called the *thigh*. This bone is alfo remarkably fhort in the fwimming quadrupeds, as the *otter*, *beaver*, and *feal*. In the laft, Cuvier fays the articular extremities make more than half its length. The bone does not appear to be quite fo fhort, according to our obfervation.

Some quadrupeds poffefs a hook-fhaped procefs upon the external fide of the femur. It has been obferved in the *tapir*, *rhinoceros*, *armadillo*, and *beaver*. It is the termination of a prominent ridge of the bone about the middle. In the *rhinoceros* this unciform procefs and the great trochanter are much prolonged, and clofe again, fo as to have a hole between them and the body of the bone.

The *bones of the leg* are very fimilar in the *monkey* kind to thofe of the human fubject. In fome fpecies the tibia is a little bent anteriorly, and more round in its fhape.

In the *bats* the *fibula* is a delicate bone. The pofition of the bones of the leg is changed in thefe animals. The thighs are directed backwards, by which means the fibular, or external fide of the leg, is fituated internally.

The *tibia* in the *bear* is a little bent forwards: the anterior tuberofity is very prominent, and the furfaces for articulation with the femur are placed far back.

The pofition of the fibula is pofterior in the *faligrada*.

In the *opoffum* tribe, the *long-tailed manis*, the *armadillo*, and the *floth*, the fibula is large and curved outwards, by which fome fpace is left between it and the tibia.

The fibula has a fingular formation in the *wombat*, which has been defcribed by Mr. Brodie. It is proportionably larger, he fays, than in other animals. At the upper extremity it is broad and has two diftinct articulating furfaces; the anterior of which is joined to the tibia, and the pofterior to a fmall bone of a pyramidal fhape, which is connected to the tendon of the external head of the gaftrocnemius mufcle, like a fefamoid bone. The lower extremity of the fibula is large, and forms about half of the articulating furface for receiving the tarfus. An inter-articular cartilage is here interpofed between the tibia and fibula, and there is another between the fibula and the tarfus. The fibula has a flight degree of motion on the tibia at its upper end, and a half rotatory motion on it at its lower end. Mr. Home fuppofes, and we think with great probability, that this rotatory motion of the bones of the hind leg is defigned to enable the animal to bury itfelf in the ground.

The fibula in many quadrupeds declines in fize, and is anchylofed with the tibia, in which there is an analogy between it and the ulna in the fore-arm.

It is united to the tibia for about the lower third in the *mole*. It is connected to the tibia the whole length pofteriorly in the *dog*. It is offified with the tibia at the inferior third of the bone in the *rat* kind. The fibula is flat, and united throughout by offification with the tibia, in the *elephant*, the *rhinoceros*, and the *hog*. There is merely a rudiment of the fibula in the *horfe*, which is anchylofed with the top of the tibia after a certain age.

In the *cloven-footed* quadrupeds, there is a fmall bone fituated on the external edge of the aftragalus. It forms the external malleolus, and is the only veftige that exifts of the fibula in this tribe of animals.

The *bones of the tarfus*, and *metatarfus*, are analogous in their varieties to the carpus and metacarpus of the fore-arm of the fame animals.

The hind-feet of the *monkies*, *lemurs*, and *opoffums*, are really hands: the metatarfal bone of the great toe is, therefore, fhorter than the reft, and capable of being moved outwards. The projection of the *os calcis*, which forms the heel, and is fo ufeful to fome quadrupeds in walking, is alfo diminifhed in thefe animals, with the exception of the *Batavian pongo*. There are other peculiarities in their tarfal bones. The articulation of the aftragalus with the bones of the leg is fo conftructed in the *monkey* tribe, that the foot refts more on the external fide than what is called the bottom; a pofition of the member well adapted for its being employed in climbing, but unfavourable in walking.

In the *lemur tarfius* and *lemur galago*, the *os calcis* and *fca-*

phoides are extremely elongated, by which the foot affumes the appearance of a hand and fore-arm.

In the *opoffum* tribe, the *aftragalus* is very fmall, and articulated almoft exactly between the tibia and fibula. The *Virginian opoffum* has a little fupernumerary bone upon the edge of the firft *cuneiform bone.*

The os calcis is of a confiderable length in the common *bat.* It has a ftyle fhape, and is inclofed in the membranes of the wing at that part. In the *vampyre bat*, the part of the bone that forms the heel turns under the foot.

The os calcis is much elongated in the *faltigrada*, particularly in the *kanguroo*, in which the bone of the heel ftands back a confiderable way from the tarfus. The *beaver* has the os fcaphoides in two pieces; one is placed before the aftragalus, and the other at the internal fide of that bone. There is a flat fupernumerary bone upon the inner edge of the tarfus. A fimilar ftructure exifts in the *marmot*. The fcaphoides is divided alfo in the *porcupine* and *paca*, but the fupernumerary bone is wanting. In the *fquirrel* it is divided, but the inner portion is fmall. In all this order of quadrupeds, the fcaphoides forms a tubercle in the fole of the foot. This, in fome fpecies, is very long, as in the *jerboa* of the *Cape*, &c. Many of the *faltigrada*, that have only three or four toes, have fome fmall bones, which are the rudiments of thofe that are deficient.

In the *three-toed floth* the tarfus confifts of four bones, the aftragalus, os calcis, and the two cuneiform bones. There is a depreffion in the fuperior part of the aftragalus for the articulation with the lower end of the fibula, which is of a cone fhape. Upon the inner fide of the aftragalus there is a convex articular furface, which rolls upon the outer fide of the end of the tibia. The confequence of this fort of joint is, that the foot of the animal cannot be bent or extended in the ufual direction, but from the outfide inwards. The os calcis is articulated with the aftragalus by a fingle tubercle, which is received into a depreffion of the latter bone, which alfo facilitates the lateral motion of the foot.

The *elephant* has the tarfus and metatarfus both very fhort. In the *hog* there are three cuneiform bones, but in the *tapir* and *rhinoceros* only two.

In the *cloven-footed* order, the cuboides and fcaphoides are united together, except in the *camel*. There is a fmall bone on the outfide of the aftragalus, and articulated with the os calcis, which takes the place of the fibula, and correfponds with the one defcribed in the fore-foot as fupplying the ulna. There are only two cuneiform bones in this tribe, and even they are anchylofed in the *camelopard*. The metatarfus is formed of two pieces before birth, as the metacarpus.

In the *horfe* the metatarfus, as in the *cloven-footed* tribe of quadrupeds, is called the *cannon* bone. It has, like the metacarpus of the fame animal, two ftyles upon its fides, which are the rudiments of the metatarfal bones, and phalanges of the fecond and third toes.

In the *jerboa* (*mus fagitta*) and the *mus jaculus*, the three middle metatarfal bones are offified together, like the common bone of the *cloven* and *folid-hoofed* quadrupeds.

The orders of *quadrumanous* and *pedimanous mammalia*, as before-mentioned, have the power of moving the great toe in the manner of a thumb. Cuvier thinks the *aye-aye*, or *Madagafcar fquirrel*, can do fo likewife.

The number of the toes on the pofterior feet of quadrupeds varies from five to one. The great toe, or pollex, is the firft that difappears.

Some of the *digitigrada* have the great toe diminifhed, and a few, as the *cat* and *dog* genera, have it entirely obliterated.

Among the *faltigrada* there is confiderable variety in the number of the toes, and the fize of the great toe when it does exift.

Many of the *edentata* and the *tardigrada* receive fpecific names, according to the number of their toes, which in thefe are always lefs than five. In the *armadillos* the great and little toe are fhorter than the reft.

Amongft the *many-hoofed* quadrupeds, as they are called, the *elephant* has five toes, the *hog* four, and the *tapir* and *rhinoceros* three.

The *bifulca* have two perfect toes upon the cannon bone, and two imperfect.

The *folipeda* have one perfect and two imperfect: the latter are merely ftyloid proceffes.

It is hardly neceffary to obferve here, that the pofition of the toes gives the name to two orders of mammalia. Their number, and their fuftaining the animal in walking, or not, determine the character of feveral natural tribes of this clafs: the titles we have ufed for the orders of mammalia throughout the prefent article, are of themfelves explanatory of their foundation: for more full information, fee the article CLASSIFICATION.

In *Plate* X. of the *Anatomy of Mammalia*, there are figures given of the three moft diffimilar fkeletons found in the clafs. *Fig.* 1. is a front view of the fkeleton of the *bat*, which is taken as the example of a flying fpecies. *Fig.* 2. reprefents the fkeleton of the *mole*, the mechanifm of which is the moft curious found amongft quadrupeds. *Fig.* 3. exhibits the fkeleton of the *porpoife*, as an inftance of the aquatic tribe of mammalia. In each of thefe figures fimilar letters are employed to indicate fimilar parts, but when any of thefe parts are out of view, or do not exift in the fkeletons, the correfponding letters are of courfe omitted: *a* is the lower jaw; *b*, the upper jaw; *c*, the inter-maxillary bone; *d*, the malar bone; *e*, offa nafi; *f*, lacrymal bone; *g*, fphenoid bone; *h*, temporal bone; *i*, os frontis; *j*, parietal bone; *k*, occipital bone; *l*, cervical vertebræ; *m*, dorfal vertebræ; *n*, lumbar vertebræ; *o*, facrum; *p*, caudal vertebræ; *q*, fupernumerary bones on the lower furface of the tail; *r*, fternum, which is fingularly formed in the *bat* and *mole*; *s*, ribs; *t*, the clavicle, enormoufly thick in the *mole*; *u*, the fcapula, greatly elongated in the *mole*; *v*, the humerus, fhort in the *porpoife*, almoft fquare in the *mole*; *x*, the ulna, with an enormous olecranon in the *mole*; *y*, the radius, which makes the fingle bone of the fore-arm in the *bat*; *z*, the carpus; 1, the metacarpal bones; 2, the digiti, prodigioufly elongated in the *bat*; 3, the fupernumerary bone of the hand in the *mole*; 4, the os innominatum: the bones correfponding to the pelvis are very fingular in the *porpoife*; 5, the femur; 6, the tibia; 7, the fibula; 8, the tarfus; 9, the metatarfal bones; 10, the digiti of the pofterior extremity. There are no bones analogous to thofe of the pofterior member in the *porpoife*.

Mufcles.—The *mufcles* of the *head* and *face* are formed upon different plans in man and mammalia. In the former, befides moving the eye-brows, ears, cartilages of the nofe, and lips, they are defigned to exhibit the various expreffions of human fentiment. But in the latter, the mufcles of thefe parts are almoft exclufively confined to thofe motions which arife out of the mechanifm of the organs of fenfe in different kinds of animals, and are confequently very different in their formation: thus, fome mammalia have the external ears greatly developed, others the nofe, and others the lips.

The *occipito-frontalis* mufcle exifts in the *monkey*, *dog*, and other genera, without any remarkable variety, except that it is thinner.

The *corrugator fupercilii* alfo is found in thefe animals:

Monkies

Monkies very frequently move the ſkin of the forehead, and frown, without however ſeeming to intend to expreſs the ſame feelings which theſe actions indicate in the human ſpecies.

The muſcles of the cheeks and lips, which give the principal expreſſions of countenance in man, are often weak and indiſtinct in mammalia, or rather replaced by a layer of muſcular fibres, reſembling the *panniculus carnoſus*.

In the *monkey*, the ſubcutaneous muſcle of the face ariſes from below the orbit and the zygoma; it is continuous with the cutaneous muſcle of the neck. It envelopes longitudinally the ſnout, and terminates on the two lips, which it opens. Below this expanſion of muſcle the *buccinator* is very diſtinctly found, particularly in thoſe ſpecies that have jaw-facs. There are alſo to be perceived a *levator anguli oris*, an *orbicularis oris*, and ſometimes a *faſciculus* correſponding to the *zygomaticus*.

In the *dog*, the upper lip is moved by an expanſion of muſcular fibres which comes from the anterior angle of the eye, and ſpreads all over the upper lip, and by another little muſcle which deſcends from the ala of the noſe, near the ſeptum in the middle of the lip. Beneath this layer there are found the *orbicularis* and *buccinator*. The lower lip is depreſſed by a very thin muſcle.

The *ruminating* and *ſolid-footed* quadrupeds have the muſcles of the lips large and diſtinct. In the *ſheep* Cuvier reckons ſeven of them; *orbicularis*, *depreſſor labii inferioris*, *buccinator*, a very large *zygomaticus*, the *levator anguli oris*, a *naſalis* of the upper lip, and a *ſubcutaneous expanſion* of fibres ariſing in the neighbourhood of the orbit, and ſpreading over the *buccinator*.

In the *horſe*, in addition to theſe, with the exception of the two laſt, there are the *levator labii ſuperioris*; the *pyramidalis* of Bourgelat, or *ſupramaxillo-naſalis magnus* of Girard; a peculiar muſcle for raiſing the angles of the lips, and a ſhort muſcle to each lip, that are called by Bourgelat *medius ſuperior*, and *medius inferior*. It is unneceſſary to give any detailed account of theſe at preſent, as they are mentioned again, and are deſcribed under the ANATOMY *of the horſe* in this dictionary.

Theſe animals require an extenſive and varied action of the lips as organs of maſtication, but the form of their face in other reſpects prevents their having much expreſſion of countenance.

The *muſcles* of the *noſe* are ſubject to conſiderable variety in mammalia. In the *monkey* they appear to have their place ſupplied by the ſubcutaneous muſcle already mentioned.

In the *digitigrada*, of which we take the *dog* as an example, the *levator labii ſuperioris alæque naſi* is ſpread over the whole cheek, in a manner ſimilar to the ſubcutaneous muſcle of the *monkey*.

When the cartilages of the noſe and the lips are prolonged together, to form a ſnout, the muſcles have a peculiar form and arrangement.

In the *mole*, the muſcles which move the ſnout are eight in number, four on each ſide. They all ariſe from above the ears, and ſend off each a long tendon to the ſnout. The two deepeſt ſeated of theſe muſcles furniſh the tendons to the ſuperior part of the ſnout, upon which they unite and form a broad aponeuroſis that covers it for ſome diſtance. The two tendons that belong to the moſt ſuperficial of the muſcles unite in a band upon the inferior part of the ſnout. All the tendons are ultimately inſerted into the elaſtic fleſhy diſk, which terminates the cartilaginous tube of the ſnout. In addition to theſe there is a ſmall muſcle that ariſes from the alveolar edge of the intermaxillary bone, and depreſſes the ſnout. There are annular muſcular fibres ſurrounding thoſe already deſcribed: theſe ſeem to be the continuation of the *orbicularis oris*.

The muſcles of the ſnout in the *hog* are ſimilar to thoſe of the *mole*, but they are ſhorter, and ariſe from different places. The firſt two come from the lachrymal bone: their tendons do not unite. The next four ariſe from the ſuperior jaw before the zygoma; the two laſt are ſmall, and ariſe from the oſſa naſi: their tendons are not joined. There is alſo the circular muſcle, as in the *mole*.

The proboſcis of the *elephant* is moved by a very complicated muſcular apparatus, of which the beſt and lateſt deſcription has been given by Cuvier, in the additions to the 5th vol. of his "Anatomie comparée." It was compoſed from the diſſection of two *elephants*.

He divides the numerous muſcles found in this organ into two principal orders; *viz.* thoſe which form the body, or interior part of the trunk; and thoſe which envelope it. The firſt order are more or leſs tranſverſe, and interſect the internal part of the proboſcis in various directions. The ſecond have more or leſs of a longitudinal courſe, or that from the baſe to the point of the proboſcis.

Cuvier again divides the longitudinal muſcles into *anterior*, *poſterior*, and *lateral*. The *firſt* ariſe from the anterior part of the os frontis, above the cartilages, and proper bones of the noſe, by a large ſemicircular line, which deſcends on each ſide as far as before the orbits. They form an innumerable multitude of faſciculi, which all deſcend parallel to each other, and are contracted by tendinous interſections occurring at very ſhort diſtances. The *poſterior* diviſion of the longitudinal muſcles ariſe from the poſterior ſurface, and inferior edge of the intermaxillary bones. They form two layers, each of which is divided into a multitude of little faſciculi, which have an oblique direction. The fibres of the external layer are directed from above downwards; thoſe of the internal take a contrary courſe, that is, from without inwards; and the faſciculi of the two layers, when they meet, form a middle line, which extends along the middle of the under part of the proboſcis throughout its whole length. Finally, the longitudinal muſcles that make the *lateral* diviſion form two pairs, of which the one is in ſome meaſure a continuation of the *orbicularis oris*, or it might perhaps be rather conſidered as analogous to the naſal muſcle of the upper lip; it comes from the commiſſure of the lips, and deſcends between the anterior and poſterior muſcles as far as the middle of the proboſcis; it ſoon divides into ſeveral ſlips, which are inſerted obliquely between the lateral faſciculi of the inferior muſcles. The ſecond lateral muſcle is analogous to the *levator labii ſuperioris*; it ariſes from the anterior edge of the orbit, and proceeds, becoming broader, to be ſpread over the root of the preceding.

Blair has conſidered the zygomatic muſcle as a continuation of the firſt of theſe lateral muſcles; and becauſe the ſterno-cleido maſtoideus is attached to the zygoma alſo, in conſequence of the want of the maſtoid proceſs, Blair thought that theſe three muſcles were but one, and therefore pretended that the depreſſors of the proboſcis came from the ſternum.

The uſe of the longitudinal muſcles of the *elephant's* trunk is ſufficiently plain. When they all act together, they ſhorten the whole proboſcis. When thoſe of one ſide act, the trunk is bent towards that ſide. The diviſions and tendinous interſections of the anterior longitudinal muſcles, enable the animal to put particular parts of the trunk into a contracted or bent ſtate, whilſt other parts are elongated, or even bent in a different direction, and thus the prodigious

variety

variety of forms and curvatures that this wonderful inftrument affumes can be accounted for.

Perrault fuppofed that the interior tranfverfe mufcles proceed as rays from the circumference of the two canals to the external furface of the trunk. Cuvier has fhewn this to be incorrect. Thofe of the anterior part proceed nearly like radii from the centre to the circumference; in the region of the axis behind the two canals there are fome fafciculi which pafs directly from right to left; thefe are furrounded by others, which go more or lefs obliquely to the circumference. It is eafily perceived that the firft and laft tend much to diminifh the diameter of the external envelope of the trunk, without abridging the capacity of the canals; but when the mufcles of the region of the axis are put into action, they contract at the fame time the canals and the external envelope. Thefe laft feries of mufcles appeared not to have been known by Perrault; and Stukely did not defcribe them, although he delineated them in his figure of the *elephant's* trunk.

All thefe little mufcles which form the body of the probofcis are very diftinct from each other, and terminate each in flender tendons, of which fome pafs through the layers of the longitudinal mufcles to gain the external envelope, and others go to be inferted into the membrane of the canals. All thefe mufcles are imbedded in a cellular tiffue uniformly filled with a white and homogeneous fat.

The tranfverfe mufcles are evidently the antagonifts of the longitudinal, and in contracting the trunk they alfo elongate the whole, or parts of it, according to the animal's pleafure.

If the number of fhort mufcles be reckoned as they appear on a tranfverfe fection of the probofcis, and if the breadth of a line which is more than their thicknefs be allowed for the fucceeding ones, the total number may be in fome degree calculated, which, when added to the number of fafciculi compofing the longitudinal layers, will amount, Cuvier fays, to between 30 and 40,000. The ftrength, the variety, and the delicacy of the motions of the *elephant's* trunk, far furpafs thofe of any other organ with which animals are endowed, and are fully explained by the mufcular ftructure above defcribed. The aftonifhment of the vulgar in feeing *elephants*, that are exhibited by fhow-men, ufe their trunk in the manner of a hand, arifes from their conceiving this moft wonderful inftrument to be nothing but a common prolongation of the fnout, which, in quadrupeds, generally is a part incapable of performing any confiderable motion.

The probofcis of the *tapir*, although much fhorter than that of the *elephant*, is formed upon the fame plan. The longitudinal mufcles are in two fafciculi, and take their origin below the eye. The tranfverfe mufcles are attached to the membrane covering the tubes, and to the external envelope, as in the *elephant;* but the *tapir* has an additional mufcle, fimilar to the *levator labii fuperioris* of the *horfe*. It arifes from the neighbourhood of the eye, and unites above the noftrils in a common tendon with the fame mufcle of the other fide. The *occipito-frontalis* in the *tapir* alfo fends off a tendon to the bafe of the probofcis, which is thereby elevated.

The mufcles of the nofe in the *cloven-hoofed quadrupeds* are two on each fide. They arife from the inferior part of the os maxillare fuperioris above the anterior molar teeth. Two of them are fuperior, and two inferior; the firft fend off each two tendons, one to the upper edge, and the other to the pofterior angle of the noftril. The mufcles divide each into three portions; they are all inferted into the inferior edge of the noftril.

There is alfo a mufcle for depreffing the nofe; it is fituated anteriorly.

The mufcles which operate upon the nares of the *folipeda* are much more complicated than in the preceding tribe. The falfe noftril is dilated by a mufcle which veterinary anatomifts have called the *pyramidalis*. It arifes from the upper jaw, near the anterior part of the zygoma, by a fmall tendon. Its flefhy part becomes broader, and expanded upon the convexity of the falfe noftril, and in the orbicularis oris. There is another mufcle fituated above the preceding. It arifes from the maxillary bone near to the notch of the offeous part of the nares; it penetrates into the fold placed between the bone and the falfe noftril, and is inferted into a cartilaginous production of the inferior turbinated bone. The femilunar cartilage is made to approach the feptum, and the noftril is dilated by a mufcle which is common to both noftrils. This is the *tranfverfalis* of Bourgelat. It appears to be an extenfion of the orbicularis oris. Superiorly there are fome fibres which arife from the nafal bone, and are inferted into the fuperior convexity of the falfe nares; thefe are the *brevis* of Bourgelat. There is another mufcle called *maxillaris* by Bourgelat, which arifes from all the anterior part of the forehead, proceeds obliquely downwards, and divides into two branches. The external paffes over the pyramidalis, is intermixed with it, and is inferted in the external convexity of the falfe noftril.

The *levator labii fuperioris* alfo acts upon the noftrils: it arifes from the lachrymal bone. Its tendon unites with the one of the other fide, to form an aponeurofis, which covers the end of the nofe, and is inferted into the upper lip.

The mufcles which move the external ear in quadrupeds are much more numerous than in man. In the defcription which Cuvier has given from the *horfe*, *fheep*, *rabbit*, and *dog*, he reckons twenty-one, fome of which are peculiar to certain quadrupeds only. He divides them into four claffes: 1ft. Thofe which pafs from the head or neck to the third cartilage of the ear of quadrupeds, which he has called the *fcutum*. The 2d are thofe which arife from fome of the parts of the head, or the cervical ligament, and are inferted into the concha or its tube. The 3d clafs contains mufcles which unite the fcutum to the concha, or to the tube of the ear. The 4th clafs confifts of thofe that extend from one part of the concha to another.

In the firft clafs there are three mufcles: the *vertico-fcutalis*, the *jugo-fcutalis*, and the *cervico-fcutalis*. The firft comes from the crown of the head, and draws the ear upwards and inwards. The fecond arifes from the zygoma, and draws the ear forwards and a little upwards: it is wanting in the *hare* and *fheep*. The third comes from the cervical ligament, and makes the one ear approach the other pofteriorly: it is peculiar to the *dog* and *rabbit*.

The fecond clafs contains feveral mufcles.

1. The *vertico-auricularis* arifes from the vertex of the head, and is inferted on the concha, which it elevates and approximates to the other: it is peculiar to the *horfe* and *fheep*.

2. The *fupercilio-auricularis* takes the place of the preceding in the *hare* and *dog*. It arifes from the fuperciliary arch.

3. The *cervico-auricularis* arifes from the cervical ligament, and is inferted upon the concha, which it pulls backwards and to the other fide.

4. The *occipito auricularis* paffes from the occiput to the concha, which it draws upward and backward: it is not found in the *hare*.

5. The *cervico-tubalis profundus* paffes from the cervical ligament

ligament to the tube of the ear, which it draws backwards: it is double in the *horfe*, and wanting in the *hare*.

6. The *occipito-auricularis rotator* arifes from the occiput, and terminates in the concha, near its tube: it exifts in all long-eared quadrupeds, and turns the ear upon its axis.

7. The *parotido-auricularis* paffes from the parotid gland to the concha, near the tragus: it depreffes the ear, and is a mufcle conftantly found.

8. The *jugo-auricularis* goes from the zygoma to the concha: it is large in the *fheep*, double in the *dog* and *horfe*, and does not exift in the *hare*.

9. The *jugo-auricularis profundus* arifes from the pofterior part of the zygoma, and is inferted into the concha, near the tube: it fhortens the tube.

10. The *vertico-auricularis rotator* goes from the vertex of the head to the anterior part of the concha, near the tube: it rotates the ear, fo as to bring the hollow part forwards and inwards.

11. The *vertico-auricularis profundus* arifes along with the preceding, and is inferted into that part of the concha neareft the tube, which is inward when its concavity is directed outward: its ufe appears to elongate the tube of the ear. Thefe laft two mufcles Cuvier only found in the *horfe*.

The third clafs contains two fuperficial and one deep-feated mufcle.

1. The *fcutalis anterior* paffes from the lower edge and anterior angle of the fcutum, to the front of the concha: it turns the latter on its axis, and directs it upwards and forwards when horizontal. It does not exift in the *dogs* that have hanging ears.

2. The *fcutalis pofterior* has nearly the fame origin as the preceding, but is inferted into the back of the concha: it raifes the concha. The *hare* wants this mufcle.

3. The *fcutalis rotator* is deep-feated, and arifes under the fcutum, and terminates behind the concha next the tube: it rotates the concavity of the concha towards the earth, and backwards, when it is horizontal. This mufcle is double in the *hare*.

The fourth clafs of the mufcles of the ear do not exift in the *fheep;* and there is only one of them in the *horfe*, which is the *tragicus:* it contracts the opening of the external meatus. It is found in the *dog* and *hare*.

In the *hare* there is a mufcle which fhortens the tube: it is called by Cuvier *tubo-helicus*.

In the *dog* there is a mufcle analogous to thofe on the helix in the human fubject. Cuvier calls it *plicator auris*.

In the *dog* and *horfe* there are fome mufcular fibres upon the back of the concha, analogous to the *tranfverfus auris*.

By means of the mufcles above defcribed, quadrupeds are enabled to give almoft all poffible attitudes to the external ear, befides collecting the founds which approach in various directions. The external ear is fometimes employed in expreffing the fenfations of animals: thus, *horfes* throw back their ears, when difpleafed; and moft quadrupeds fhew their fatisfaction by an erect pofition of thofe parts.

The *mufcles which move the jaws* in mammalia are, except in fome of the *faltigrada*, the fame in number, and bear the fame names as thofe in man. They differ chiefly with refpect to their relative ftrength. This circumftance has been in a great meafure already explained, in defcribing the form and extent of the bones to which thefe mufcles are attached.

As a general obfervation, it may be ftated, that the *maffeter* and *pterygoid* mufcles are largeft in the *herbivorous* quadrupeds, and the *temporal* in the *carnivorous*.

In the *ant-eaters*, the pofition of the *maffeter* is very unfavourable to its action. The tubercle that fupplies the place of the zygoma is anterior to the part of the lower jaw, to which the other extremity of the maffeter is affixed; confequently the fibres of the mufcle pafs in a direction contrary to that in which their force is exerted.

In the *mus typhlus*, the *temporal* mufcle is very ftrong, although it is thin in this tribe generally. The *typhlus* has it fo much extended as to be intermixed with the one of the oppofite fide, upon the upper part of the head.

The *mole* has the temporal mufcles very thick and elongated, fo that their greateft extent is from behind forwards. They touch each other upon the crown of the head.

In the *carnivorous digitigrada*, efpecially the *cat* genus, the temporal mufcles have fo great a bulk in every direction, that they make up the chief part of the bulk of the head.

An additional mufcle on each fide, for raifing the lower jaw, has been difcovered in the *cavy*, and other *faltigrada*, by Mr. J. F. Meckel, which is defigned to aid thefe animals in their particular mode of comminuting their food. This mufcle has received the name of *mandibulo-maxillaris*. In the *cavy* it commences as a thick mafs, from the moft anterior part of the fuperior maxillary bone, proceeds backwards and downwards acrofs the great fub-orbitar foramen, which it fills, and changes there into a ftrong tendon, which defcends to the lower jaw, to be inferted on the outfide of the pterygoideus externus mufcle, oppofite the firft molar tooth, that is, in the moft anterior part of the canal, in which the pterygoid mufcles are inferted. Thefe mufcles are generally fimilar in the other *gnawing* quadrupeds: they are mufcular throughout in the *rats*, in whom they are very ftrong. The action of the mandibulo-maxillaris mufcle has a direct effect upon the incifor teeth, or upon the extremities of both jaws; and hence the exiftence of this mufcle in thofe *faltigrada* that gnaw hard fubftances. The mandibulo-maxillares are wanting in the *hare* and *marmot*, which live on foft herbs.

The *digaftric* mufcle, except in the *monkey*, is differently formed than in man. The name of *mafto-maxillaris*, impofed upon it according to the modern fyftem of nomenclature, is peculiarly proper. It generally wants the middle tendon, which forms it into a mufcle with two bellies, or a *digaftricus*. In the *mandril* (*fimia maimon*), the tendons of the maftoid portions of each fide become intermixed above the hyoides, fo that thefe two portions appear to make a digaftric mufcle.

In the *digitigrada* this mufcle has but one belly, and it is inferted into a procefs at the pofterior angle of the branch of the jaw.

In the *faltigrada* there are two portions.

This mufcle is wanting in the *ant-eaters* and *armadillos*. Thefe animals have its place fupplied by a long flender mufcle, that arifes from the middle of the top of the fternum, and is inferted at the inferior and middle part of the ramus of the lower jaw. This mufcle is called by Cuvier the *fterno-maxillaris*.

In the *floths* the digaftric is connected with the *fterno-hyoideus* mufcle.

The *ox* has the middle part of this mufcle covered above and upon the internal edge by an aponeurofis, which gives attachment to a fquare mufcle, that extends from one digaftric to the other.

The *mufcles of the os hyoides* exhibit no very ftriking peculiarities, except in fome of the *edentata*.

The *fterno-hyoidei* mufcles in the *lion* arife fo far within the fternum as the third piece compofing that bone. In the

fea-

feal they arife from the firft ribs, and are ftrengthened by a flip from the little tuberofity of the humerus, which correfponds to the *omo-hyoideus*. The fternum is narrow in thofe animals, to which Cuvier afcribes the fterno-hyoideus as having an unufual origin.

The *fterno* and *omo-hyoidean* mufcles are incorporated, and make a very large mufcle in the *dolphin*.

The *ftylo-hyoideus* is only perforated by the digaftric mufcle in the *monkey*, as in man.

In the *paca* the *ftylo hyoideus* is wanting: the ftyloid bone is not connected with the cranium; and the middle portion of the digaftricus adheres firmly to the body of the os hyoides.

The *mylo-hyoideus* is an active mufcle in bringing forwards the hyoides, when this bone is placed far back, and the jaw is much elongated.

The pofition of the os hyoides being fo near the fternum in the *ant-eaters*, the mufcles which act upon it have many peculiarities. There is a very fmall mufcle which is analogous to the *ftylo-hyoideus*: it arifes from the middle and anterior part of the ftyloid bone; it defcends inwards and backwards, to be united to the edge of the *genio-hyoideus*. The *mylo-hyoideus* is neceffarily very long: it does not touch the os hyoideus, but its laft fibres afcend to the bafe of the ftyloid bone, to which they are affixed; and, more anteriorly, fome of thefe fibres even afcend to be inferted into the tranfverfe proceffes of the middle cervical vertebræ. Thofe which precede the laft mentioned are inferted more internally, into the membrane of the bottom of the mouth. It is only the portion correfponding to the two anterior thirds of the jaw, that is attached to the edge of that bone. There is no middle tendinous line in this mufcle, and all its fibres are tranfverfe in their direction. The *genio-hyoideus* is a fingle mufcle: it is attached to the angle of the chin by a very thin tendon, which extends to the oppofite angles of the jaw, accompanying the middle of the *mylo-hyoideus*: its flefhy part commences there. It is very thin throughout, and is at firft narrow, but it afterwards enlarges, and then is compofed of two portions: it contracts again, before it is attached to the body of the hyoides. The *fterno-hyoidei* mufcles extend upon the fternum, as far as the middle of the bone.

In the *echidna* the *mylo-hyoideus* is attached in a great meafure to the palatine membrane: the moft diftant portion afcends upon the fides of the occiput.

In the *ornithorhynchus* the *mylo-hyoideus* has a tendinous line in the middle, from which the mufcular fibres depart on each fide, and proceed obliquely from behind forwards, and are inferted into the inferior border of the jaw. There is a fecond portion of this mufcle, which appears to fupply the place of the *genio-hyoideus* in this animal. Its fibres depart from the hyoides and the bafe of the tongue, and advance more obliquely outwards, as far as the moft diftant part of the branches of the jaw, to the lower edge of which they are attached. The *fterno-hyoideus* is prolonged upon the fternum, as far back as the middle of that bone, both in the *echidna* and *ornithorhynchus*. It is difficult to conceive the ufe of the extenfion of the mufcle in the latter animal. In the *echidna* and the *ant-eaters* it is fubfervient to the motions of their tongue.

The mufcle called by Cuvier *ftylo-maftoideus* is peculiar to mammalia, in which it appears to exift pretty regularly. It is a fmall mufcle, arifes from the external furface of the maftoid procefs, and is inferted upon the internal furface of the temporal end of the ftyloid bone. When the ftyloid bone, as in the *cloven-hoofed quadrupeds*, has an angle prolonged pofteriorly, this mufcle is inferted into it, and moves the ftyloid bone as a lever, and brings its lower end upwards and outwards. When the ftyloid bone is not attached to the cranium, this mufcle ferves to fufpend it.

In the *paca*, the *ftylo-maftoideus* feems to form a part of the digaftric, with which it defcends to the os hyoides, and is afterwards extended upon the fides of the pharynx, by which it fupplies the place of the *ftylo-pharyngeus*.

In the *digitigrada*, there is another additional mufcle: it is thin, flat, and fills up a part of the interval of the two horns of the os hyoides of the fame fide.

The *mufcles of the pharynx* refemble thofe of man fo much, that a defcription of them becomes unneceffary.

There is a *pharyngeus proprius* in the *elephant*, *bear*, &c. which has been already mentioned.

The *ftylo-pharyngeus* has fome peculiarity of direction and effect, in confequence of the horizontal pofition of the pharynx. It defcends almoft perpendicularly from the ftyloid procefs, or bone, upon the upper furface or fides of the pharynx, and it is only after it has paffed under the conftrictor mufcles that it proceeds backwards along the pharynx. Its operation is rather to dilate the bag of the pharynx than to bring it forwards.

The peculiarities of the mufcular ftructure of the tongue are already noticed in the firft part of this article, where that member is defcribed as an organ of maftication.

The *fubcutaneous mufcles* are much more remarkable in quadrupeds than the human fubject. In the latter, they are weak, and confined to particular places; but in the former, almoft the whole of the fkin can be moved; and in thofe fpecies that roll themfelves up when they are in danger, the fubcutaneous mufcles are of great magnitude, and complicated in their arrangement.

The *cutaneus* or *latiffimus colli*, (*thoraco-facialis* of Cuvier) is inconfiderable in many quadrupeds. It is intermixed with fome mufcular fibres that lie under the fkin of the face in the *monkey* kind, as already obferved. In the *marmot*, this mufcle has another placed under it, which is thicker, and extends to the fide of the head, and to the face and fnout.

There is a cutaneous mufcle upon the abdomen, and under the fkin of the thighs of quadrupeds, which is inferted, along with the pectoralis major, into the humerus by one or two tendons. Befides acting upon the fkin of the lower furface of the body, it concurs, with the actions of the pectoral mufcle, in bringing the arms inwards, and in the true quadrupeds is a mufcle of progreffion, by affifting to move the body forwards upon the anterior extremities. Cuvier gives the name of *dermo-humeralis* to this mufcle. In the *racoon* it is attached to the prepuce, which it retracts. Where it covers the belly of this animal, it is very thin. In the *marmot* this mufcle covers the back as well as the under furface of the body: it is inferted into the arm by two tendons; the one with that of the latiffimus dorfi; the other with the tendon of the pectoralis major.

Thofe animals that have the power of rolling themfelves up, poffefs a number of curious mufcles for the purpofe. Thefe are the moft numerous and ftriking in the *hedge-hog*.

In this animal there is a very extenfive fubcutaneous mufcle upon the back of the body. Its fibres adhere clofely to the fkin of the back and the ends of the fpines. The fhape of the mufcle is oval: the middle of it is thin, and has the fibres moftly arranged longitudinally; but around the edge they are thick, and have a circular direction, and refemble a fphincter mufcle.

In the ordinary pofition of the *hedge-hog*, the dorfal mufcle is contracted, and entirely carried upon the back; but when

when the creature is coiled up, the longitudinal fibres of the mufcle are fo much relaxed, that it is capable of being extended over the top of the head, the tail, and pofterior legs; after which the fphincter or marginal fibres are put in action, by which the whole body is inclofed, as it were, in a round bag.

There are feveral fmall diftinct mufcles which ferve to connect this flefhy oval expanfion to different parts of the body, and which contribute to bring the head and limbs into their proper pofition, after they have been doubled up by the mufcles fituated upon the inferior part of the body. Two pair of thefe mufcles arife from the anterior extremity of the oval mufcle. They are inferted into the nafal and intermaxillary bones, and the lateral parts of the nofe.

One pair of mufcles arifes from the pofterior part of the oval expanfion: they are broad, pyramidal, and inferted by tendon into the fides of the tail, near its end.

There are three diftinct portions of mufcles under the fkin, upon the lower furface of the body. The firft correfponds to the cutaneus colli: it arifes from the top of the fternum, and is inferted behind the ears. The fecond is pofterior to this; it arifes from the middle of the fternum; it paffes over the top of the fhoulder, and is inferted into the oval or orbicular mufcle of the back. Thefe two mufcles, with their fellows of the oppofite fide, produce the figure of two cones, having their points turned backwards, and the one being received into the bafe of the other. The third mufcle covers with its fellow the furface of the abdomen. It is attached to the tail, the top of the thighs, the arm, and the dorfal mufcles, by fo many diftinct flips or divifions. This mufcle is analogous to the *dermo-humeralis* of other quadrupeds.

There are, befides thofe already defcribed, fome deep-feated mufcles fituated under the great oval one of the back. One arifes from the pofterior edge of the meatus auditorius externus, and proceeds backwards to be loft in the fore-part of the orbicular mufcle. Another arifes from the laft cervical vertebræ, and is alfo inferted into the orbicular mufcle. Underneath the great oval mufcle there is a thin layer of tranfverfe fibres: the anterior ones are attached to the inner and upper part of the humerus, and the pofterior to the external procefs of the ventral or *dermo-humeralis* mufcle.

When the orbicular mufcle is entirely contracted, and carried upon the back of the *hedge-hog*, it ferves as the fixed attachment of the mufcles, which go from it to the head, neck, and tail; and thefe parts are confequently raifed or fuftained by them; but when the animal wifhes to roll itfelf up, it relaxes the orbicular mufcle, and puts into operation the flexors of the head and limbs, by which they become fixed points, and all the ftraight mufcles connected with the oval or orbicular mufcle of the back are enabled to act upon it, and fpread it over the body; and when the latter is brought over the head and tail, the margin of it contracts feparately from the reft, by which even the head and feet of the animal are completely inclofed. The connection which the great oval mufcle has with the roots of the fpines of the fkin, puts the fpines into a ftate of erection in different directions, which renders the animal unaffailable at every point. See Himly's account of the rolling up of *hedge-hog*, printed at Brunfwick, 1801, 4to.

The *mufcles* that act immediately upon the *ribs* have no peculiarities in mammalia worth remarking.

The *abdominal* mufcles are longer and narrower in mammalia than man. This depends, in fome degree, upon the difference in the fhape of the trunk, but not entirely, as the *ftraight* and *pyramidal* mufcles are generally the moft elongated. In many of the *digitated* quadrupeds the *pyramidales* are wanting, and the *recti* extend as far as the anterior part of the fternum.

The *diaphragm* exhibits, in general, no difference of ftructure in mammalia from what is defcribed in man. According to Cuvier, it has in the *bats* two very ftrong crura, which form a kind of flefhy feptum placed longitudinally on the fpine within the abdomen.

Thofe animals that have an abdominal pouch for containing the mammæ and the young during the period that they are fuckled there, have two additional bones attached to the pelvis, as already mentioned. Thefe bones are moved by two mufcles, long fince defcribed by Tyfon, and called by him *triangulares*. Thefe fibres arife in different directions from the fide of the marfupial bones next the fymphyfis pubis, and both mufcles unite with each other, in the middle of the interval, between the two bones, by means of a tendinous line. Thefe mufcles fuftain, elevate, and approximate the marfupial bones, in doing which they are affifted by the abdominal mufcles, which are likewife connected with thefe bones. The mufcles which move the head upon the fpine, and the different vertebræ upon each other, exhibit but few deviations from the ftructure defcribed in man, that are worthy of remark.

In moft mammalia, the *obliquus capitis inferior*, and the *rectus capitis pofticus major*, are much larger than in man, in proportion, on account of the magnitude of the two firft vertebræ of the neck being greater. The *monkey* and *cetaceous* tribes, however, form exceptions to this obfervation.

The *biventer cervicis* is commonly not divided by tendon into two bellies: the new name of *trachelo-dorfalis* given to it by Cuvier is particularly proper. In the *digitigrada* it is interfected by tranfverfe tendons throughout. It is quite diftinct from the *complexus*, although it lies upon it. The *horfe* has thefe two mufcles joined together at the upper part.

The *fplenius* is larger in mammalia than in man, and is particularly ftrong in the *mole*. In thofe that have the ligamentum nuchæ elevated above the vertebræ, the *fplenius colli* is inferted into it. There is no part of the mufcle inferted into the tranfverfe proceffes of the cervical vertebræ in the *digitigrada*.

The mufcles of the dorfal fpine conform ftill more clofely in general, than thofe of the cervical, to the plan obferved in man. In the *bat*, however, thefe mufcles are nearly obliterated.

The *mufcles* of the *tail*, in almoft all mammalia, are larger and more complicated than they are in man, but in particular fpecies they are very remarkable for their number, or their ftrength. Cuvier has reckoned eight pair of mufcles in mammalia, but if the portions of which thefe are compofed be counted in any of the long-tailed fpecies, they will be found to be vaftly numerous. Mery ftated that he met with 280 caudal mufcles in a *prehenfile-tailed monkey*. The *cetacea* have the mufcles of the tail fo large as to give to thefe animals the figure of fifhes. The *beaver* has the flexor mufcles of the tail prodigioufly ftrong, in order that it may be able to employ that member in the manner of a trowel for plaftering its habitation. The *kanguroo* has the extenfors very ftrong, as the animal ufes the tail to project the whole body from the ground in its fingular mode of progreffion by leaps.

In defcribing the caudal mufcles we fhall follow Cuvier and Vic d'Azir.

The *facro-coccygei fuperiores* of Cuvier, or *lumbo-fupra-*

caudales

caudales of Vic d'Azir, are fituated upon the upper fide of the tail. They arife, by flefhy flips, from the three or four laft lumbar vertebræ, the facrum, and from thofe caudal vertebræ that have proceffes. Small tendons pafs off from the common mafs oppofite to the flefhy digitations. The firft tendon is the fhorteft, and is inferted into the bafe of the firft caudal vertebra. The fecond tendon to the next vertebra, and fo on to the end. There are thirteen of thefe tendons. They enter ligamentous grooves or fheaths, which are connected together by a ligamentous web that inclofes them in a fort of cafe. Thefe mufcles have the effect of directly raifing the tail.

The *interfpinales* (*fpinales obliqui* of Cuvier,) (*lumbo-facro-coccygei* of Vic d'Azir), fhould be confidered as the continuation of the *inter-fpinal* mufcles of the back. They cooperate with the laft defcribed in the elevation of the tail.

There are four pair of mufcles for depreffing the tail.

The *ilio-fubcaudales* (*ilio-coccygei* of Vic d'Azir) arife from the internal part of the ileum; form two long flefhy maffes in the pelvis; and are inferted into one of the V fhaped bones of the under furface of the tail. Sometimes they are inferted between the fifth and fixth of thefe bones, at others between the feventh and eighth.

The *facro-fubcaudales* (*facro-coccygei inferiores* of Vic d'Azir) refemble exactly the facro-coccygei fuperiores, except that they are placed upon the oppofite fide of the tail. They arife from the facrum, and from the tranfverfe proceffes of the fuperior caudal vertebræ. Their tendons are long and numerous, and inclofed in a fheath, like thofe of the facro-coccygei fuperiores. They begin in the long-tailed fpecies to be inferted into the feventh caudal vertebra, and fo on.

Thefe mufcles, with the *fuperior coccygeal*, operate upon the tail, even to its point, and have exactly the oppofite effects of each other. They are particularly employed in all the more delicate motions of the tail.

The *fubcaudales* of Cuvier (*inter-coccygei* of Vic d'Azir) are fituated under the middle of the tail. They arife at the articulation of the firft and fecond caudal vertebræ. They are firft inferted into the V fhaped bone of the fourth, fifth, and fixth vertebræ; they further receive little flefhy flips, which gradually diminifh, and go on to be inferted into the bafe of each bone of the tail.

The *pubo-fubcaudales* of Cuvier (*pubo-coccygei* of Vic d'Azir) arife broad and thin from the upper part of the pelvis, and proceed to terminate in points which are inferted into the proceffes or tubercles at the bafe of the fourth and fifth vertebræ, upon the inferior furface of the tail. They bring the tail clofe to the body. Thefe mufcles are wanting in the *racoon*.

There are two mufcles on each fide of the tail for producing the lateral motions of it.

The *ifchio-caudalis* of Cuvier (*ifchio-coccygeus externus* of Vic d'Azir) arifes from the internal furface of the ifchium, and paffes backwards over the tranfverfe proceffes of the tail. In the *racoon*, it is inferted into the feven caudal vertebræ that fucceed the third, by feven flefhy digitations. In the *opoffum*, into the four firft vertebræ of the tail. In the *dog*, it is a mere flip of flefh, and is inferted into the fourth vertebra.

The *intertranfverfalis* paffes from one tranfverfe procefs to the other on each fide, as far as they go. This mufcle is fimilar to the one of the fame name in the other parts of the fpine.

It is fcarcely neceffary to obferve, that the combined actions of thefe mufcles, or their contractions in oppofition to each other in different parts of the tail, are capable of communicating to this member all poffible directions. The effects of this co-operation are ftrikingly difplayed in the tails of certain *monkies*, *marfupial animals*, *ant-eaters*, &c. in which this member is capable of performing moft of the operations of a hand.

There are feveral peculiarities to be noticed in the *mufcles* of the *anterior extremity*, particularly thofe of the fhoulder and upper arm of quadrupeds.

The *ferratus major* has not only the digitated attachments to the ribs, but to fome or all the tranfverfe proceffes of the cervical vertebræ. In the *dolphin*, and probably in all *cetacea*, this mufcle has no attachment to the cervical vertebræ; the greater extent of the ferratus major appears to be required for progreffion on four feet.

The *pectoralis minor* does not exift in the *digitigrade* and *hoofed quadrupeds*. Another mufcle fupplies its place in the *horfe*. This is united to the pectoralis major, and is in part inferted into the humerus. The pectoralis minor of the *dolphin* is narrow, and arifes by one digitation from near the top of the fternum, and is inferted at the glenoid cavity of the fcapula.

The *levator fcapulæ* is inferted into the fpine of the fcapula in the *monkey*, the *digitigrade* and *faltigrade* quadrupeds. In the *dog* and *bear* it arifes from the firft cervical vertebra only, and in the *rabbit* from the cuneiform procefs of the caput, and has been called by Vic d'Azir *acromio-bafillaris*. In the *fheep* it arifes from the firft cervical vertebra, and is inferted into the pofterior part of the fpine of the fcapula. The *levator fcapulæ* is wanting in the *horfe*. In the *dolphin* it comes from the firft cervical vertebra, and its tendon is fpread over the whole external furface of the fcapula.

The *trapezius* and *fterno-cleido mafloideus* are generally confounded with each other, or with fome of the other mufcles of the neck. In the *carnivorous*, and thofe *faltigrade* quadrupeds that have an imperfect clavicle, the clavicular portions of the *fterno-cleido mafloideus*, and of the *deltoides* and of the *trapezius*, make but one mufcle, to which Cuvier gives the name of *mafto-humeralis*, and which has been called by other anatomifts *communis capitis*, *pectoris*, and *brachii*. The clavicular portion of the *trapezius* is diftinct from the fcapular portion; and the levator fcapulæ paffes between them. In the *bear*, the anterior portion of the *trapezius* is again divided into two mufcles, one of which fends a tendon to the top of the fternum. In the *fheep*, there is a mufcle which arifes from the maftoid procefs; it divides into two; one goes to the fternum; and the other is incorporated with the clavicular portion of the *trapezius* and of the *deltoid*. In the *horfe* there is a diftinct *fterno-mafloideus*, but the *cleido-mafloideus*, *levator fcapulæ*, and the clavicular portions of the *trapezius* and *deltoid*, are fupplied by one mufcle, which arifes from the maftoid procefs, and the tranfverfe proceffes of the fuperior cervical vertebræ, and paffes down the internal fide of the arm to be inferted inferiorly. In the *dolphin*, the clavicular portion of the *trapezius* is wanting: the *fterno-mafloideus* of this animal is very ftrong, and there is another mufcle external to it, which arifes from the maftoid procefs alfo, and is inferted below the head of the humerus.

There is a mufcle of the fhoulder apparently peculiar to the *rabbit*: it is thin, and arifes from the fpine of the fcapula, and is inferted into the clavicle.

The *rhomboides* is a larger mufcle in quadrupeds, in proportion, than it is in man. It is even in the *monkey* tribe extended to the occiput. The portion arifing from the fkull is diftinct in the *digitigrade* quadrupeds, and is the

 mufcle

mufcle which has been called the *levator fcapulæ magnus*. This portion of the *rhomboides* arifes from the ligamentum nuchæ in the *horfe*, and has been called by the veterinary anatomifts *levator fcapulæ proprius*. The rhomboides has no divifion, and is a fmall mufcle in the *dolphin*.

The *fubclavius* is of courfe wanting in thofe quadrupeds that have imperfect clavicles, or none.

We have referved the account of the mufcles of the fhoulder in the *mole* and *bat* for feparate confideration, as the motions of the anterior extremity in thefe animals are fo very peculiar.

In the *mole*, the *ferratus major* is extremely large, but fimple in its form; it arifes from only the laft cervical vertebra. The *trapezius* has no anterior origin; there are only two fafciculi from the lumbar region to the pofterior angles of the fcapulæ, which would draw thefe bones afunder, if they were not bound together by a ftrong tranfverfe ligament. The *rhomboides* is attached pofteriorly almoft entirely to this tranfverfe ligament of the fcapulæ, and anteriorly to the offified ligamentum nuchæ. The chief ufe of this mufcle is therefore to elevate the head. The mufcle correfponding to the occipital portion of the *rhomboides* arifes from the middle of the head, has its fibres parallel to the cervical fpine, and paffes through the *rhomboides*, properly fo called, to be attached to the tranfverfe ligament of the fcapulæ. This mufcle operates with great power in raifing the head, which is a neceffary exertion to the *mole* in burrowing. This animal has two mufcles to the clavicle: one of thefe Cuvier calls *fuperclavius*: it arifes from the firft bone of the fternum at the anterior angle of the great head of the clavicle. The other arifes lower down on the fternum, and is inferted near the firft.

In the *bat*, the *ferratus major* is fituated before the *pectoralis minor*. It is only attached to the ribs, and is inferted into the inferior and external edge of the fcapula. The *fubclavius* is very large. The *trapezius* arifes from the eleven firft dorfal vertebræ, and is inferted into the triangular furface of the cervical angle of the fcapula. The *maftoid* mufcle is only attached to the fternum.

The *mufcles* of the *humerus* appear all to exift in mammalia, but frequently under different conditions than in man.

The *pectoralis major* is commonly compofed of feveral diftinct fafciculi, or portions. In thofe fpecies which have not a perfect clavicle, there is a portion of this mufcle arifing from the fternum, and inferted into the linea afpera, which, with the portion of the oppofite fide, makes a common mufcle for both arms, to which Cuvier gives the name of *ambibrachialis communis*. It has the effect of croffing the fore-legs. In the *fheep*, there is a fecond common mufcle, which paffes from the fternum to the ulna, completely inclofing the humerus with the trunk. It is defigned to crofs the fore-legs, and has been called by the veterinary anatomifts, in the *horfe*, *ambibrachialis communis*. It fhould rather, perhaps, be confidered a fubcutaneous mufcle than a portion of the pectoralis major. In the *bat*, the *pectoralis major* is divided into three diftinct mufcles. The laft lies partly under the firft. This is inferted into the great anterior tubercle of the humerus. The fecond is inferted above the firft, behind the great tubercle; and the third mufcle terminates upon the fpine of the humerus. Thefe mufcles deprefs the wing in flying, and therefore require to be very ftrong.

The *latiffimus dorfi* of the *bat* is a flefhy ftripe from the fpinous tubercles of the two laft dorfal vertebræ.

The *fupra* and *infrafpinatus* of quadrupeds have a different relative fize to each other than in man. In the former, the fupraspinatus is the larger mufcle. In the *cetacea*, the mufcles on the back of the fcapula are nearly obliterated.

In thofe fpecies that want the clavicle, there is only the fcapular portion of the *deltoides*, the other part being, as before defcribed, continued into the *trapezius*. There is a diftinction of two parts alfo in the fcapular portion, the *acromial* and *infra-fpinal*. In the *horfe*, the acromial attachment is wanting, and the deltoid having the fame direction as the infrafpinatus, it is diftinguifhed by the peculiar name of *abductor longus brachii*.

The *coraco-brachialis* confifts of two parts in the *monkey*, *bear*, &c. one of which extends the whole length of the humerus. In the *bear*, the inferior portion is inferted into the external condyle. When there is no coracoid procefs of the fcapula, this mufcle arifes from a little eminence on the upper edge of the fcapula.

In the *dog*, *cat*, *rabbit*, and *horfe*, the *biceps* arifes by one head, and is unconnected with the coraco-brachialis.

In the *bat*, there is no *coraco-brachialis* nor *teres minor*.

The mufcles which move the humerus are of an extraordinary bulk in the *mole*. The *pectoralis major* is almoft as large as the pectoral mufcles of *birds*. It confifts of fix portions: four of thefe arife from the fternum, and are inferted into different points of the humerus; the fifth comes alfo from the fternum, and covers the whole furface of the humerus; the fixth is extended from one humerus to the other. The *latiffimus dorfi* is alfo very ftrong; it is divided into two parts. The *teres major* is prodigioufly ftrong. Upon thefe three mufcles chiefly depend the rotation and the retraction of the anterior limbs of the *mole*, the motions by which it excavates the earth with fuch extraordinary force and rapidity.

The *fupinators* and *pronators* of the fore-arm are not found in thofe fpecies of mammalia which either have the ulna immoveable, or obliterated. The *cat* and *dog* have the *fupinator brevis*, but not the *longus*. The *rabbit* has only the *pronator teres*.

Monkies, the *cat*, and *bear*, have the fame number of flexors and extenfors of the *carpus* as the human fubject. In the *cloven* and *folid-hoofed* quadrupeds, the *external radialis* is inferted anteriorly into the bafe of the cannon bone, which it extends; this is the *extenfor rectus anticus* of Bourgelat. The *radialis internus* is the *flexor internus* of Bourgelat. The *ulnaris internus* is the *flexor obliquus* of the fame author; it is inferted into the bone that correfponds to the *os pififorme*. The *ulnaris externus* is inferted likewife into the fame bone, and is called by Bourgelat the *flexor externus*. The mufcle analogous to the *ulnaris externus* in the *bat*, arifes from the os brachii, and from the radius as far as its middle. Its tendon is inferted into the upper and internal part of the carpus, which it abducts. The mufcle correfponding to the *ulnaris internus* arifes from a flefhy portion common to it, and the other mufcles of the fore-arm, and is inferted into the external fide of the firft phalanx of the laft finger. It adducts the carpus. The *adductor pollicis* has the fame common origin, and fends its tendon obliquely acrofs that of the *ulnaris externus*, and is inferted into the internal fide of the carpus at the bafe of the thumb.

The *extenfor communis digitorum* exifts in all quadrupeds. Its tendons correfpond to the number of fingers. The portion, which merely extends the little finger in man, is of greater fize, fupplies more fingers, and is more diftinct in many mammalia. In the *monkey* and *rabbit* it has two tendons, and fends one to the fourth finger. In the *dog* and *bear* it furnifhes a tendon alfo to the third and middle fingers.

The

The *cat* has two mufcles in place of this divifion of the extenfor communis. In the *cloven-footed* cattle this mufcle extends the outer toe, and the *extenfor indicis* the internal.

There are two mufcles in the *horfe:* one is called by Bourgelat *extenfor lateralis*, and by La Foffe the *extenfor of the paftern.* It fends the tendon to the fide of the firft joint of the toe.

The other mufcle is fituated between the preceding, and the one analogous to the *extenfor communis*, of which it is confidered by fome anatomifts as making a part.

The *indicator* has two tendons in the *monkey*, one of which goes to the middle finger: this mufcle does not exift in the *rabbit*, the *folid* and *cloven-footed quadrupeds.*

The *extenfor brevis pollicis* is not found in the *cat, dog, bear*, and *rabbit*. The *extenfor longus* fends a tendon to the firft finger in the *bear.*

The *flexor longus pollicis* is wanting in the *monkey*, and its place fupplied by a fifth tendon from the *flexor profundus communis.*

In the *dog*, the *flexor profundus* unites with the *flexor pollicis*, and the latter feparates to go to the thumb. The *flexor fublimis* fends a tendon to the thumb.

In the *cat*, the *flexor profundus* confifts of five diftinct flips, and fends off as many tendons. The *fublimis* alfo fends a tendon to the thumb.

In the *rabbit*, the *profundus* furnifhes a tendon to the thumb, but the *fublimis* not.

The flexors furnifh fewer tendons, of courfe, where there are fewer digiti; for inftance, they fend off but two in the *cloven-footed*, and one in the *folid-hoofed* quadrupeds. The *bat*, which has fo many peculiarities of the anterior extremity, has only one *extenfor* of the digiti: its fine tendons run along the back of each of the elongated fingers that fuftain the membrane of the wing, to the extenfion of which they contribute. The *flexor communis* arifes from the common mafs of mufcle upon the infide of the fore-arm: its delicate tendons unite with the *flexores proprii* of the joints of the wing. Thefe laft mufcles are four in number; they form a flefhy mafs where they arife from the carpus; become connected with the tendons of the *flexor communis*, and are extended to the ends of the joints of the radii of the wing. Some fhort fibres arife from the carpus, and are inferted into the root of the pollex.

The mufcles of the fingers are obliterated in the *cetacea.*

The mufcles of the *inferior*, or, more properly, *pofterior* extremity, that arife within the body, are, in general, fimilar in man and mammalia. The *pfoas parvus* has been obferved to be wanting in the *rat.*

The *bat* wants the *quadratus lumborum, pfoas magnus, iliacus internus, pyriformis, gemini, obturator internus*, and *quadratus femoris.* The *pfoas parvus*, is, however, very ftrong in this animal, and its aponeurofis broad; the *pectineus* and *obturator externus* are long and flender. The *pectineus* of the *dog* fends its tendon to the lower part of the femur. Quadrupeds, in general, have the *pfoas magnus* and *iliacus* more elongated in their figure than they are in man.

There is a ftriking difproportion in the *gluteal* mufcles of mammalia. The *external*, called in man *gluteus maximus*, is in all quadrupeds the fmalleft of the three. In the *horfe*, it is little more than an aponeurotic expanfion, and is called by Bourgelat the *gluteus minimus.* The diminifhed fize of this mufcle, proves that its chief ufe in the human fubject is to move the pelvis upon the thigh, and to maintain the erect pofition of the body. In the *horfe*, this mufcle has, in addition to the thin flefhy head from the facrum and back of the ileum, another thin flip from the top of the ileum.

The *gluteus medius* and *minimus* are found much larger in proportion in quadrupeds than man. The *medius* in the *horfe* is very large: it arifes from the facrum, all the membrane between that bone and the ileum and ifchium, and is inferted into the procefs of the femur that Cuvier has been inclined to call a third trochanter. This mufcle draws the limb backwards, as in the action of kicking In the *bat*, the *gluteus minimus* defcends almoft perpendicularly from the ileum to the femur. This animal has but one *adductor* femoris, or head of the *triceps:* it goes from the fymphyfis of the pubis to the femur, about one-third from its top.

The fhape of the thigh is rather flat in the true quadrupeds, and even in the *monkey* it is lefs round than in man. The mufcles are thrown forwards and backwards, which is the moft convenient pofition for progreffion on four feet. The great fize of the mufcles upon the internal part of the thigh of the human fubject is not defigned, as anatomifts generally ftate, to bring the legs together, or to beftride a horfe, or, in cafe of fhipwreck, the maft of the veffel, but in the ordinary progreffion, on two feet, to transfer the weight of the body from one fide to the other.

The *fartorius* and *gracilis* are placed upon the anterior part of the thigh in the *digitigrade* and *faltigrade* quadrupeds. The *fartorius* is called in the *horfe adductor longus.* The *gracilis* is large in all quadrupeds, and efpecially in the *hoofed* orders. It is called by Bourgelat the *adductor brevis.* He gave the name of *gracilis* to the mufcle correfponding to the *femi-tendinofus.*

This laft mufcle, and the *femi-membranofus*, are inferted into the tibia by a broad aponeurofis, lower down than in man, by which means the hind legs are always, in a degree, bent, a circumftance favourable to progreffion on four feet, but very inconvenient in the erect pofition of the body. Even the *monkey* has this form of the limb, and for that reafon, as well as others, cannot remain long ftanding, without fupporting itfelf by the anterior extremities. In the *bat*, there is one mufcle which fupplies the place of the *fartorius, gracilis, femi-tendinofus*, and *femi-membranofus.* It arifes by two portions: the one from the fore-part of the ileum, the other from the pubis and ifchium. The *adductor femoris* paffes between them. The common tendon produced by thefe two mufcles is inferted below the head of the tibia, on what is the fore-part of the leg in the *bat.* This mufcle bends the leg. There is but one mufcle alfo for extending it, which arifes from the upper part of the femur, and is a flender tendon, which is inferted into the tibia.

The mufcles compofing the calf of the leg are much fmaller in mammalia than man, in proportion to the fize of the animals. The *foleus* arifes from the head of the fibula: it is peculiarly flight in the *cloven* and *folid-hoofed* quadrupeds.

The *tibialis anticus* is inferted into the anterior furface of the lower part of the *cannon* bone in thofe quadrupeds that have this bone.

The *tibialis pofticus* of the *monkey* has a large fefamoid bone in its tendon. In quadrupeds that want the great toe, the tendon is inferted into the metatarfal bone of the firft toe, which it abducts or feparates from the reft. This mufcle does not exift when there are cannon bones.

The *peroneus longus* in the *monkey* adducts the great toe to the others. The other peroneal mufcles of the *monkey*, and of the quadrupeds with claws, refemble the fame mufcles of the human fubject. The *rabbit*, however, is an exception. The *peroneus medius* fends a tendon to the laft toe but one. In the *cloven-footed* order, the *peroneus longus* croffes below

below the joint of the cannon bone to be inserted into the firſt os cuneiforme. The tendon of the *medius* extends to both the toes, and the *peroneus brevis* does not exiſt. There is only one peroneal muſcle in the *horſe:* its tendon joins that of the extenſor of the ſingle toe.

The *plantaris* muſcle, which terminates upon the os calcis in the human ſubject, is a ſtronger muſcle in mammalia: it ſupplies the place of the *flexor brevis digitorum perforatus* in quadrupeds. It is continuous with the *plantar faſcia* in the *monkey*, from the diſſection of which animal this muſcle probably received the name it bears.

In the *wombat*, according to Mr. Brodie, there is a peculiar muſcle of the leg. It is ſituated between the tibia and fibula throughout their whole length. The fibres have their origin from the inner edge of the fibula, and paſs obliquely, inward and downward, to be inserted into the oppoſite ſurface of the tibia. The operation of this muſcle is to bring the fibula forwards, and produce a degree of rotation on the tibia which turns the toes inwards. This muſcle is oppoſed in its action by the one that correſponds to the *biceps*, and which is inſerted into the poſterior part of the fibula. It brings the toes back into the ſtraight line, but does not turn them outwards.

There are ſeveral peculiarities in the arrangement of the flexor muſcles of the toes in the *monkey*. The part of the *flexor brevis* that goes to the firſt toe only is attached to the os calcis. The ſhort flexors of the great and little toes reſemble that of the human ſubject. The *flexor pollicis longus* gives a tendon to the pollex, or great toe, and two perforating tendons to the third and fourth toes. The *flexor longus digitorum* ſupplies two perforating tendons to the ſecond and fifth toes. The three perforating tendons of the third, fourth, and fifth toes do not come from the bone of the heel, but have their fleſhy fibres ariſing from the *flexor longus digitorum*. The tendons of the long flexors are united together. The *acceſſory flexor*, or *maſſa carnea*, has an aponeurotic attachment to the tendon of the *flexor longus pollicis*, and ſends a ſtrong tendinous band to the tendon of the *flexor longus digitorum*.

The *flexor longus pollicis*, when there is no great toe, has its tendon incorporated with that of the flexor longus digitorum, as in the *dog*, &c.

The *monkey* has a *long abductor* of the great toe; it is ſituated upon the inner ſide of the extenſor longus pollicis.

The *extenſor pollicis* is wanting in thoſe that have not the great toe, ſuch as the *dog* and *rabbit*.

In the *cloven-hoofed* quadrupeds, the inner toe has an *extenſor proprius*, which repreſents the *extenſor pollicis*. This is wanting in the *horſe*.

The quadrupeds that have cannon bones in place of metatarſal, have the muſcle correſponding to the *ſhort extenſor of the toes* ariſing from the cannon bone, and inſerted into the tendon of the long extenſor.

Plate XI. of the *Anatomy of Mammalia*, exhibits the muſcles which move the integuments of the *hedge-hog*. *Fig*. 1. is the *hedge-hog* in the coiled ſtate, and covered by the orbicular muſcle, which is expoſed by diſſection. *Fig*. 2. ſhews the animal in the relaxed ſtate: *a a* is the orbicular muſcle contracted, and carried upon the back; *b b*, its marginal part, reſembling a ſphincter; *c*, *c*, two muſcles going from the orbicular muſcle to the top of the head; *d*, the muſcle of the left ſide, which is one of another pair that extends from the orbicular to the head; *e*, *e*, the two muſcles from the orbicularis to the tail; *f*, part of the muſcle which correſponds to the cutaneous colli, ſeen going to be attached behind the ears; *g*, a portion of the muſcle which comes from the middle of the ſternum to the orbicularis; *h*, the cutaneous muſcle of the belly; *i*, the portion of the ſame muſcle which paſſes over the ſhoulder to be inſerted into the humerus. There are other deep-ſeated muſcles which connect the orbicularis with the body and neck, that are concealed by thoſe indicated in this figure.

Plate XI. and *fig*. 3, is a portion of the trunk of an *elephant*, cut in different directions, in order to expoſe its ſtructure. A is the horizontal ſection, in which are ſhewn the little tranſverſe muſcles, *a*, cut croſs-ways, and ſome others cut longitudinally (as indicated by *b*); B is the vertical ſection made lengthways, by which the naſal canal of the left ſide at C is divided. The little tranſverſe muſcles are, by this ſection, cut longitudinally at *b*, and tranſverſely at *c*. Some other little analogous muſcles are ſhewn in their length by *d*; and *e* points out the longitudinal muſcles of the proboſcis, which antagoniſe theſe laſt. D is the vertical ſection made croſs-ways. The little tranſverſe muſcles are ſeen in their length, paſſing in different directions, with reſpect to the axis and circumference of the trunk, but always tranſverſely. They are ſituated within the longitudinal muſcles of the trunk, which laſt are ſeen divided croſs-ways by this ſection, around the circumference of the trunk, as pointed out by the letters *f*, *f*: in this ſection are ſeen alſo many veſſels and nerves cut croſs-ways. Some large nerves, with blood-veſſels accompanying them, are ſhewn running in the direction of the ſection A, as pointed out by the letter *g*. C, C, are the two naſal canals which run in the interior of the trunk, ſomewhat nearer the lower ſurface than the centre.

Brain.—This viſcus is formed upon the ſame plan in *man* and *mammalia*. The chief differences conſiſt in the figure and ſize of the parts, in relation to each other, to the reſt of the nervous ſyſtem, or to the entire body.

The relation with reſpect to bulk, between the brain and the whole body, has been generally conſidered as determining the degree of intelligence poſſeſſed by an animal. That the mental character ſhould be indicated by the proportion which the organ of perception bears to the parts which exerciſe the other functions of life, ſeems to be almoſt ſelf-evident; and is conformable to common opinion and obſervation, with reſpect to the intellectual powers of different individuals of the human ſpecies. Nevertheleſs it ſhould be obſerved, that ſome differences muſt ariſe from the age and the degree of fatneſs of an animal, which cannot be ſuppoſed to affect materially the powers of the mind, although they do the weight of the body.

A compariſon of the weight of the cerebrum with that of the cerebellum, is another mode employed by anatomiſts for aſcertaining the degree of intellect an animal enjoys, and is more accurate and preciſe than the preceding. In the inferior claſſes of animals, the diminution of the cerebrum in proportion to the cerebellum is very ſtriking, and forms a very correct index of the gradations of intellect. But for the purpoſe of fixing the mental rank of the different tribes of mammalia, it is beſt to compare the brain with the medulla oblongata, or the nerves that ariſe in the cranium. This may be done, after the manner of Soemmerring and Ebel, by meaſuring the diameters of each at their thickeſt part. This laſt mode ſeems to ſhew, with tolerable accuracy, the intellectual endowment of the different genera of mammalia, except in the *whale* tribe, which have the brain ſo very broad in proportion to its length. The ſame rule alſo ſerves to correct the concluſions that would be drawn from comparing the weight of the brain with that of the whole body, in ſome of the *monkey* kind, and the very ſmall quadrupeds, which have as large a brain in proportion to their body as man.

In

In judging of the capacities of animals, we ſhould carefully diſtinguiſh between the operations of intellect and of inſtinct. Theſe are often miſtaken for each other in animals, and, we believe, are more frequently confounded in the workings of the human mind than people in general are aware of. The brain is the ſeat of reflection, and of *ideal* knowledge: the nerves and organs of ſenſe are but its agents; they are incapable of performing any intellectual operation of themſelves. The perfection of the organs of ſenſation determines, however, in a great degree, the *inſtinctive* faculties of animals, independently of the influence of the brain. Indeed the intellectual and inſtinctive powers are found, like the organs upon which they depend, to exiſt in an inverſe ratio to each other. Man, who has the higheſt mental character, has the brain largeſt, and the nerves ſmalleſt in relation to each other; and in the inferior claſſes of animals, whoſe actions are almoſt entirely governed by inſtinct, the nerves are uncommonly large, and the brain extremely ſmall; and even in ſome genera hardly diſtinguiſhable.

To illuſtrate this ſubject, the following tables have been extracted from Cuvier's "Comparative Anatomy," vol. ii.

Table I. exhibits the proportion of the ſize of the brain to that of the whole body.

Man, according as he is young or old	$\frac{1}{22}$ $\frac{1}{25}$ $\frac{1}{30}$ $\frac{1}{35}$
Long-armed ape, or *gibbon*	$\frac{1}{48}$
Orange monkey (*ſimia ſciurea*)	$\frac{1}{22}$
Capucin monkey (*ſimia capucina*)	$\frac{1}{25}$
Striated monkey (*ſimia jacchus*)	$\frac{1}{28}$
Four-fingered monkey (*ſimia paniſcus*)	$\frac{1}{41}$
Malbrouck (*ſimia faunus*), young	$\frac{1}{24}$
The *green* and *red monkies*	$\frac{1}{81}$
Varied monkey (*ſimia mona*)	$\frac{1}{24}$
White-eye-lid monkey (*ſimia æthiops*)	$\frac{1}{46}$
Hare-lipped monkey, or *macaque*	$\frac{1}{96}$
Barbary ape	$\frac{1}{105}$
Great baboon	$\frac{1}{104}$

Lemurs.

Ring-tailed maucauco (*lemur catta*), young	$\frac{1}{61}$
Vari (*lemur macaco*)	$\frac{1}{44}$

Cheiroptera.

Great bat (*veſpertilio noctula*)	$\frac{1}{96}$

Plantigrada.

Mole	$\frac{1}{36}$
Bear	$\frac{1}{265}$
Hedge-hog	$\frac{1}{168}$

Digitigrada.

Dog	$\frac{1}{47}$ $\frac{1}{50}$ $\frac{1}{57}$ $\frac{1}{153}$ $\frac{1}{161}$ $\frac{1}{305}$
Fox	$\frac{1}{205}$
Wolf	$\frac{1}{230}$
Cat	$\frac{1}{82}$ $\frac{1}{94}$ $\frac{1}{156}$
Panther	$\frac{1}{247}$
Martin	$\frac{1}{315}$
Ferret	$\frac{1}{135}$

Saltigrada.

Beaver	$\frac{1}{290}$
Hare	$\frac{1}{228}$
Rabbit	$\frac{1}{140}$ $\frac{1}{152}$
Ondatra, or *muſk beaver*	$\frac{1}{124}$
Rat	$\frac{1}{76}$
Mouſe	$\frac{1}{43}$
Field mouſe	$\frac{1}{31}$

Multungulata.

Elephant	$\frac{1}{500}$
Hogs — *Wild boar*	$\frac{1}{672}$
Hogs — *Domeſtic hog*	$\frac{1}{512}$ $\frac{1}{212}$
Hogs — *Siameſe hog*	$\frac{1}{451}$

Bisulca.

Stag	$\frac{1}{290}$
Roe, young	$\frac{1}{94}$
Sheep	$\frac{1}{351}$ $\frac{1}{192}$
Ox	$\frac{1}{860}$
Calf	$\frac{1}{219}$

Solipeda.

Horſe	$\frac{1}{400}$
Aſs	$\frac{1}{254}$

Cetacea.

Dolphin	$\frac{1}{25}$ $\frac{1}{36}$ $\frac{1}{66}$ $\frac{1}{102}$
Porpoiſe	$\frac{1}{93}$

Table II. ſhews the proportion that the cerebellum bears to the brain. In *man* it is as 1 to 9

In the *Orange monkey*	1 : 14
Capucin monkey	1 : 6
Barbary ape	1 : 7
Varied monkey	1 : 8
Dog	1 : 8
Cat	1 : 6
Mole	1 : $4\frac{1}{2}$
Beaver	1 : 3
Rat	1 : $3\frac{3}{4}$
Mouſe	1 : 2
Hare	1 : 6
Wild boar	1 : 7
Ox	1 : 9
Sheep	1 : 5
Horſe	1 : 7

Table III. is to point out the relation between the breadth of the medulla oblongata behind the pons Varolii, and that of the brain. In *man* it is as 1 to 7

In the *Short-tailed macaque*	1 : 5
Chineſe monkey	1 : 4
Dog	6 : 11
or	3 : 8
Cat	8 : 22
Rabbit	3 : 8
or	1 : 3
Hog	5 : 7
Ram	5 : 7
Stag	2 : 5
Roe	1 : 3
Ox	5 : 13
Calf	2 : 5
Horſe	8 : 21
Dolphin	1 : 13

The

The brain of the *monkey* refembles moft clofely that of the human fubject; but is neverthelefs diftinguifhed by certain differences, which form, as it were, the firft fteps in the gradations of ftructure in this organ.

The fuperior furface of the *hemifpheres* is fomewhat flatter in the *monkey* than in man; but in *quadrupeds* it is confiderably flatter. In fome of them alfo, as moft of the *digitated*, the anterior part of the cerebrum is much narrower than the pofterior. The *hoofed* quadrupeds generally have the brain nearly oval in its circumference, as it is in man and the *monkey*.

In quadrupeds the *middle lobes* of the cerebrum are flattened upon the inferior furface, and the pofterior lobes do not exift; confequently the cerebellum is not concealed by the cerebrum, as in man and the *monkey*.

The brain of the *porpoife*, *dolphin*, *grampus*, and moft probably others of the *whale* kind, has a figure different from that of any other animal: it is rounded at every part. Its greateft diameter is acrofs, yet it covers the fuperior part of the cerebellum: it has numerous and deep convolutions.

In mammalia, even in the *monkey*, the middle lobes of the cerebellum are larger, in proportion to the lateral ones, than they are in man. Thefe lobes are of the fame fize of the others in the *faltigrada*.

The divifion of the external furface of the brain into *convolutions* takes place to a lefs extent in mammalia than in man. There are few convolutions in the *monkey* tribe, particularly in thofe with prehenfile tails, which have the pofterior lobes nearly fmooth. The *jacko* and *Barbary ape* are exceptions, and have the pofterior lobe feparated from the others by a diftinct tranfverfe fiffure.

In the *digitigrada* and *plantigrada* the furrows upon the furface of the brain are tolerably numerous, and are arranged in a regular order.

The *faltigrada* have no convolutions, properly fpeaking, but very faint grooves: their brain is almoft fmooth upon the furface. There are deep convolutions on the brain of the *hoofed* quadrupeds, efpecially the *cloven* and *folid-footed* tribes.

The lower furface of the brain of mammalia is lefs unequal; the different prominences not projecting fo much as in man.

The *olfactory* nerves of quadrupeds are of an enormous fize, and contain a cavity which communicates with the lateral ventricles: they are compofed of cineritious fubftance externally, and medullary internally. They were defcribed by the early anatomifts under the names of *carunculæ mammillares*, or *proceffus mammillares*. They are found of the greateft fize in the large herbivorous quadrupeds.

There are no olfactory nerves in the *cetaceous* animals.

Except the peculiarities we have juft mentioned, the origin of the nerves is the fame in man and mammalia.

The *lateral ventricles* have lefs extent in all mammalia, except the *monkey*, than in man. That portion of their cavity which is called the *pofterior horn*, or *digital cavity*, is only found in the *monkey*, in which the pofterior lobes exift.

The *tubercula quadrigemina* become larger, in proportion as the animals are removed from man. They are of the greateft fize in the *faltigrada*, *bifulca*, and *folipeda*. There is a very fingular proportion obferved between the fuperior and inferior of thefe tubercles. In all the *herbivorous* tribes of quadrupeds, the *nates*, as they have been called, exceed very much in fize the *teftes*; and in the carnivorous quadrupeds, whether *digitigrade* or *plantigrade*, the inferior tubercles or *teftes* are larger than the *nates*; from which it might be fuppofed that the relative magnitude of thefe parts indicate the difpofition of the animal. Cuvier ftates, that the teftes are three times the fize of the nates in the *dolphin*.

But few obfervations have been made upon the comparative ftructure of the *pineal gland*. The gritty or earthy fubftance of this body has been difcovered in the *fallow deer* (*cervus dama*) by Soemmerring; and in the *goat* by Malacarne. It is not known in what number of quadrupeds the earthy matter exifts in the pineal gland: it may be prefumed, from its being found in the fpecies above mentioned, which are lefs allied to the human fubject in general ftructure than many others of this clafs, that the fandy matter would be met with generally in the pineal gland of mammalia.

The *corpora candecantia* are fmall in the carnivorous quadrupeds: there is but one large eminence of this kind in the herbivorous tribes.

The other eminences and cavities of the brain of mammalia exhibit no peculiarities worthy of notice.

The *tentorium cerebelli*, in many mammalia, is fuftained by a thin plate of bone, which projects from the inner furface of the cranium in one or three pieces.

In fome inftances the tentorium is an uniform bony partition, which leaves a quadrangular opening into the lower part of the cranium This is the cafe in moft fpecies of the *cat* and *bear* genera; in the *martin* and in the *coati* (*fimia panifcus*).

The *falx*, which divides the hemifpheres of the cerebrum, is alfo fuftained upon a bony plate in the *ornithorhynchus*. Blumenbach ftates, that fomething of the fame kind exifts in the fkull of the *porpoife*; but the fpecimen to which he refers, appears to have been an irregular formation of the bones of the cranium.

The *membranes* of the brain do not exhibit any other peculiarities of much importance in mammalia.

The *blood-veffels* of the brain have been defcribed already under the heads of *Arteries* and *Veins* in this article.

In *Plate* XII. of the *Anatomy of Mammalia*, *fig*. 1. is a lateral view of the external appearance of the brain in the *rabbit*. The anterior part of the cerebrum is feen to be fmaller than the pofterior. The middle lobes are flattened upon their inferior furface; and the pofterior lobes are wanting: *a a* fhew the cerebrum; *b*, the cerebellum; *c*, the medulla oblongata. *Fig*. 2. is a view of the under furface of the anterior part of the cerebrum of the *fheep*: *a*, *a*, the olfactory nerves; one of which is laid open to expofe its cavity, which is traced to the lateral ventricle, by cutting through the fubftance of the cerebrum. *Fig*. 3. is a tranfverfe fection of the brain of the *monkey*: *a a*, the corpora ftriata; *b b*, the thalami nervorum opticorum; *c c*, the cavities of the lateral ventricles laid open; *d d*, the digital cavities; *e e*, the nates; *f f*, the teftes; *g g*, the pineal gland; *h*, *h*, the cut furfaces of the hemifpheres. *Fig*. 4. is a view of the tubercula quadragemina in the *fheep*: *a a*, the nates; *b b*, the teftes; *c c*, the furrounding portion of the brain. *Fig*. 5. is a fimilar view of thofe parts in the brain of the *dog*, which are indicated by correfponding letters.

Nerves.—There is no part of the anatomy of mammalia in which there is fo clofe a refemblance to the human, as in the diftribution of the nerves. Where differences do occur, they are in general plainly referrible to the difference in the figure of the neighbouring parts, and not to any phyfiological reafon.

The *firft pair of nerves*, or the *olfactory*, afford a ftriking exception to the foregoing obfervation. In all mammalia which poffefs them, except the *monkey* kind, they are large, hollow proceffes of the anterior lobes of the cerebrum, the cavities of which communicate with the lateral ventricles of the brain, as already defcribed. This peculiarity of ftructure, however, does not appear to produce much effect upon them after they have paffed through the ethmoid bone into the nafal cavity. The only difference to be remarked between the branches of the olfactory nerves of quadrupeds and thofe of man, is, that they are ftronger, and more eafily demonftrated in the former.

The *fecond pair of nerves*, or *optic*, have precifely the fame ftructure in mammalia and man before their entrance into the globe of the eye. The medullary tubes of which they are compofed, are more plainly fhewn in the larger quadrupeds.

The *third*, *fourth*, and *fixth pair of nerves*, exhibit no peculiarities.

The *fifth pair of nerves* fhews fome difference in its ramification, and the ganglia it forms, although its diftribution is, as nearly as may be, the fame in mammalia and man. Cuvier has given fome account of the three principal branches of the fifth pair of nerves, taken from diffections of the *dog*, *rabbit*, *fheep*, and *calf*.

According to Cuvier's defcription, the firft, or *ophthalmic* branch of the fifth pair, is divided within the cranium, but does not form its three branches until it arrives in the orbit.

The firft, which is analogous to the *nafal* branch of the ophthalmic, is the largeft. It is divided into five or fix fmall nerves. Some of thefe pafs through the vault of the orbit to the frontal finufes: others, which are larger, enter the nafal cavity by the internal orbitar foramen. They afcend in an offeous canal, and pafs into the cranium by the large foramina of the cribriform bone, and pafs down again through the ethmoidal foramina, to be diftributed, as in man, to the pituitary membrane of the nofe. Thefe branches are very plain and eafily traced in the *cloven-footed* quadrupeds: one of them feems to have been miftaken by Cuvier for a branch of the olfactory in the *fheep*. One or two of the branches into which the nafal divides, go to the levator palpebræ fuperioris. One of thefe twigs affifts in forming the *lenticular ganglion*, which in the *dog* gives off two *ciliary* nerves that divide before they enter the eye, and in the *calf* it fends off four ciliary nerves. Finally, the nafal fends filaments to the obliquus inferior mufcle, and the glandula Harderi.

The *fecond*, or *frontal* branch of the *ophthalmic*, is fituated fuperiorly under the roof of the orbit. It divides into two nerves; one is external, and furnifhes two filaments to the rectus fuperior and the levator palpebræ; the other is internal, and fupplies the internal ftraight mufcle of the eye, and gives off the frontal branch which paffes through the fuperciliary notch, to be diftributed to the integuments of the forehead.

The *third*, or *lacrymal* branch of the *ophthalmic*, furnifhes a great number of filaments that are expended upon the lacrymal gland.

The *fecond* branch of the *fifth pair*, or the *fuperior maxillary* nerve, when it arrives on the outfide of the cavity of the cranium, becomes confiderably enlarged. Its fibres feem to crofs each other in fuch a manner, that the two branches which it foon after forms appear to be produced by oppofite filaments: thus, the pofterior, or *fub-maxillary* branch, feems to be compofed of the anterior filaments, and the anterior or fupra-maxillary branch of the pofterior fibres. This difpofition is very remarkable in the *dog*, but lefs fo in the *calf*.

The fupra-maxillary branch proceeds almoft horizontally from behind forwards. Having reached the anterior and inferior parts of the temporal foffa, it divides into a great number of fafciculi: one bundle, which confifts of four or five filaments, proceeds towards the fpheno-palatine foramen. This fafciculus then divides into two; one branch is fent into the nafal cavity, and furnifhes a confiderable nerve, which is fpread out upon the flefhy fubftance of the palate. Sometimes, as in the *calf*, this branch feparates from the trunk, even before it enters the fpheno-palatine hole.

The other branch of the fuperior maxillary nerve, which enters by the fpheno-palatine hole, paffes into the body of the fuperior maxillary bone, detaches filaments to all the teeth, and goes out by the fub-orbitar foramen, where it expands into a great number of branches, which fupply the mufcles and integuments of the face, and anaftomofe with the branches of the facial nerve. The *fub-orbitar nerve* and its branches are of a prodigious fize in all mammalia with whifkers; in thefe animals its anaftomofes are more intricate than ufual, and from the net-work under the fkin about the lips, the bulb of each whifker receives one or more large nerves.

There are fome other filaments given off from the fuperior maxillary nerve. The firft is a fmall one, which, after anaftomofing with a ganglion, paffes into the fubftance of the temporal mufcle, to which it gives branches. It afterwards perforates the orbit, and from thence goes into the nofe. Another more remarkable filament arifes from the fpheno-palatine branch; it forms a ganglion, which is joined by the preceding nerve, as already mentioned, and feveral other twigs. A flat nerve proceeds from this ganglion, which appears to be the continuation of the nerve that formed it, although larger. It paffes between the palatine and the convexity of the pterygoid procefs, in the fubftance of the bone: amongft other branches it fends one down to the floor of the noftrils.

The *third*, or *inferior maxillary* branch of the *fifth pair* of nerves, produces, almoft immediately after its feparation, a pretty large branch, which is diftributed to the parotid and maxillary glands. It afterwards divides into two other branches; one which is internal, and is loft in fmall filaments in the mufcles, and even in the fubftance of the tongue; the other is external, and fends a number of branches to the pterygoid mufcles, and thofe of the cheeks and lips, on their way to the fkin of the face on which they are loft, anaftomofing with the other facial nerves. The continuation of the fuperior maxillary nerve paffes, as ufual, into the canal of the lower jaw, fupplies the teeth, and emerging at the foramen mentale, fpreads in branches upon the foft parts in the neighbourhood.

In the *calf*, the inferior maxillary nerve, foon after leaving the cranium, divides into four branches.

The moft pofterior of thefe branches goes backwards, and below the condyle of the jaw, where it forms two branches; one is flender, and enters the parotid gland, to which it gives filaments, which anaftomofe with thofe of the facial nerve: the other takes the circuit of the jaw, and advances in the front of the mouth; it unites, as it paffes along the cheek, with the middle branch of the facial nerve, from which it previoufly receives feveral anaftomofing branches.

The next branch of the four is very long, flender, and follows the ramus of the jaw to be expended upon the buccinator mufcle and the glands.

The third branch paffes into the dental canal, and fupplies the teeth as ufual.

Laftly,

Laftly, the fourth branch is the lingual: it is ftrong and flat, and terminates in radiated filaments.

The *facial* nerve, commonly called the *portio dura* of the *feventh pair*, arifes in the *calf*, according to Cuvier, by two roots; the one is really the portio dura: the other appears to proceed from a confiderable ganglion of the pofterior part of the *par vagum*, which is fituated in a particular depreffion of the inferior furface of the bone of the tympanum: this root alfo appears to unite with the great fympathetic nerve, which has almoft the firmnefs of cartilage. Two or three fhort filaments concur in the formation of this root. It afterwards becomes thicker, and paffes into the fiffura Glafferi to meet the other roots of the facial nerve, to which it tranfmits a filament, and continues to proceed outwards before and below the ear.

The magnitude of the branches of the facial nerves varies in mammalia, but with refpect to number, they fcarcely differ from thofe of the human fubject. In thofe quadrupeds that have large ears, the branch of the facial nerve, which unites with the firft cervical pair, is of much greater fize than ordinary. In the carnivorous kinds, alfo, the nerves going to the temporal mufcle are particularly large, and in all mammalia with whifkers, the branches that anaftomofe with the facial nerves of the fifth pair have a confiderable fize.

There is nothing peculiar to be obferved with refpect to the *portio mollis* of the *feventh pair*, or the true *auditory nerves*.

The fpecies that Cuvier had diffected for the *par vagum*, or *pneumo-gaftric* nerve, were the *calf*, *dog*, *racoon*, *hog*, and the *porcupine*, in all of which, its diftribution and ramifications bore the greateft refemblance to the fame nerve in the human body. The connection it has with the facial nerve in the *calf* already mentioned, was the chief peculiarity obferved.

The *gloffo-pharyngeal*, and the *hypo-gloffal* nerves, exhibit no deviation from their difpofition in the human body, as far as they have been examined.

The *hypo-gloffus* was found by Cuvier to have a blueifh colour in the *calf*, until it arrives on the infide of the ramus of the lower jaw.

The *fub-occipital* and the *cervical* nerves alfo appear to be formed exactly as in man. They are of courfe in fome quadrupeds larger in proportion than in others, on account of the fize of the mufcles on the neck. In the *three-toed floth*, there are probably nine cervical nerves correfponding to the number of vertebræ in that animal.

The *phrenic* nerves differ in no refpect from thofe of man.

The *dorfal* and *lumbar* nerves vary only in regard to their numbers, which may be reckoned by the vertebræ. The *nerves* of the *pelvis* alfo exhibit no peculiarity in mammalia.

The nerves which fupply the tail are of fome confequence in this clafs, and do not exift in the human fubject. The following defcription has been given of them in the *rabbit* by Cuvier.

The *firft pair* of caudal nerves comes out between the laft piece of the facrum and the firft vertebra of the tail, and proceeds by the ifchiatic notch. It divides into two branches, one of which is united to the fchiatic nerve, and the other continues to advance between the pelvis and the tail, until it enters a gland fituated under the fixth pair of caudal nerves, where this branch terminates: but in its way thither it forms feveral anaftomofes with the other caudal nerves, and gives off branches, by which there is a remarkable plexus formed, which Cuvier calls the *caudal*.

The firft branch fent off by this nerve is diftributed among the gluteal mufcles. The nerve is afterwards joined on the inner fide by a fmall filament, that feems to be derived from the fecond pair of caudal nerves, and on the outer fide by three or four filaments, which make a plexus, from whence feveral branches go to the mufcles; one, which is very confiderable, and eafily traced, is fent to the penis. Afterwards the third, fourth, and fifth pair of caudal nerves fend filaments to the inner fide of the branch of the firft pair: then five or fix branches are given off from the external fide of the mufcles of the penis, and thofe which arife from the ifchium. Finally, the trunk of the firft caudal pair terminates in the gland, as above-mentioned.

The *great fympathetic*, or *intercoftal* nerve, has been defcribed by Cuvier from diffections of the *wolf*, *racoon*, *porcupine*, *fheep*, and *calf*. He found it to form a very remarkable anaftomofis with the fifth and fixth pair of nerves. On entering the cranium through the foramen lacerum, the intercoftal is diftinct from the par vagum, and adheres very clofely to the periofteum of the temporal bone. If the cord of the nerve be ftretched, it is feen to be divided into fix or feven filaments, that form a clofe network. A few lines farther, thefe filaments approach each other, and become confolidated into a ganglion, which, from its great firmnefs, appears like cartilage. Many filaments depart from this ganglion: fome are fhort, and proceed to the nerve of the fifth pair: others are long, fmall, and are interwoven with the blood-veffels, fo as to form a reddifh-coloured plexus, which was confidered by Willis as a little *rete mirabile*. The communication with the fixth pair is by means of this plexus, which furrounds the nerve on every fide, and is hardly to be feparated from it. There is not any remarkable anaftomofis obferved in the *calf* and *ram*.

The great intercoftal, while paffing through the foramen lacerum, detaches a filament to the cavity of the tympanum. At the fame place alfo it is united with the eighth pair of nerves.

The *fuperior cervical ganglion* is formed fome lines from the cranium. It has a reddifh colour, and an elongated oval figure. It forms the fame communication with the neighbouring nerves as in man.

In front of the laft cervical vertebra the intercoftal nerve forms a curve from within outwards, towards the firft rib, on the head of which it joins the firft thoracic ganglion. Several filaments from this curve go along the mediaftinum to the pericardium: others form a plexus around the fubclavian artery.

The *firft thoracic ganglion* is a femilunar figure. Some filaments go off from one of its edges; the uppermoft of which is fent to the vertebral artery, around which it forms a plexus, and appears to accompany the veffel into the cranium. The other filaments unite with the laft cervical, and with the two firft dorfal pair of nerves.

The concave edge of the ganglion detaches two or three filaments, which defcend obliquely to the root of the pulmonary arteries, where they unite with the par vagum, to form the *pulmonary* and *inferior cardiac plexufes*.

The intercoftal, in its paffage through the thorax, produces a ganglion upon the head of each rib, which is joined by a filament from each of the dorfal nerves.

The intercoftal, on entering the abdomen, forms a fingle cord, which is the *fplanchnic nerve*. It paffes into the middle, under the ftomach, where it frequently feparates into two cords, which are afterwards joined together again. From this fort of nervous ring, there arifes either a principal trunk, or four or five filaments, which, uniting together near the cœliac artery, form a ganglion, that is frequently of a femilunar

lunar figure. The filaments that produce the *ſtomachic*, *ſplenic*, and *hepatic plexuſes*, ariſe from the ſemilunar ganglion, and correſpond to the *ſolar plexus*. There are alſo filaments detached to form the *renal* plexus.

The intercoſtal, as it proceeds along the lateral parts of the bodies of the vertebræ, gives origin to *ganglia* of an elongated quadrangular figure: one of the ſuperior angles of theſe receives the continued trunk of the nerve; the other the lumbar pair. The internal inferior angle ſends a branch to the aorta, to concur in the formation of plexuſes, which encompaſs each of the branches of that veſſel. The external inferior angle furniſhes the continuation of the trunk.

Except the variations above-mentioned, there does not appear to be any material difference between the intercoſtal or great ſympathetic nerve in man and animals.

Scarcely any peculiarity is to be perceived in the diſtribution of the nerves of the extremities in mammalia. The *articular* nerve is excluſively formed in the *rabbit* by the fifth cervical pair of nerves; only one of its filaments is derived from the axillary plexus.

The *thoracic* nerves are furniſhed by the axillary plexus.

The *median nerve*, about the middle of its courſe, ſends off a branch, which is analogous to the *external cutaneous* nerve.

The *ulnar* nerve alſo, about the middle of the arm, gives off a branch, that appears to take the place of the *internal cutaneous* nerve: it ſupplies the extenſor muſcles of the elbow and the ſkin.

Both the origin and diſtribution of the nerves of the poſterior extremity appear to correſpond with what has been deſcribed in man.

Organs of Touch.—The general ſurface of the body in mammalia is better calculated for receiving external impreſſions than it is in any other animals, except thoſe that have naked and ſoft ſkins, ſuch as certain reptiles, and ſome of the inferior claſſes. The ſkin of mammalia is well ſupplied with nerves; the cuticle is thin, and the hairs, having their roots buried in the ſkin, rather facilitate than impede the ſenſation of touch.

The *cuticle* has the ſame ſtructure in man and mammalia. It is moſt delicate in the ſmaller quadrupeds, and in thoſe that have their body well defended by other coverings, as very thick hair or ſpines. The cuticle is particularly thin in the *porcupine*.

It is dry, and conſiſts evidently of ſcales, on the tail of the *beaver*, *rat*, *ondatra*, &c. and upon the ſurface of the bodies of the *pangolin* and *armadillo*.

In the *large many-hoofed* quadrupeds the cuticle is thick, and is covered with ſmall plates, that ſeparate from it like ſcales. It ſinks into the furrows of the true ſkin. On the ſoles of their feet it is very remarkably formed. It appears externally to be divided by deep impreſſions, nearly circular, with ſix or eight ſurfaces, ſome more regular, others leſs ſo, each of which contains an infinite number of ſmall polygons, that are very irregular. Theſe polygons, both the large and ſmall, correſpond to furrows in the true ſkin, into which internal projections of the cuticle are inſerted.

The cuticle of the *cetacea* is not thick in proportion to the other parts of the ſkin. It is free from folds or wrinkles; the ſurface of theſe animals being ſmooth, to facilitate their progreſs through the water. It is alſo beſmeared with oil, which not only is of uſe in ſwimming, but prevents the maceration of the cuticle in the water.

The *colouring matter* of the *ſkin*, or *rete mucoſum*, as it is commonly, though improperly, called, is uſually thin, and of a light colour in thoſe parts of the bodies of quadrupeds which are covered by hair: on particular parts, however, and in certain animals, it is various in its colour. It is generally black upon the uncovered parts of the ſkin, as the ſnouts of quadrupeds, the hands of *monkies*, &c. It has but rarely very vivid colour, as in the other claſſes of animals. The *monkey* kind ſhew examples in which the cheeks have a painted white or blue colour, and the noſe or iſchiatic calloſities are red, violet, or carmine.

The pigment of the ſkin of the *cetacea* vaſtly exceeds in thickneſs that of all other animals. It is about the tenth of an inch thick in the *porpoiſe*, and in the larger ſpecies of the *whale* tribe it is proportionably thicker. It appears like a ſolid ſubſtance, which divides very readily after maceration into layers, and alſo in the vertical direction into fibres, like the pile of velvet. This laminated and fibrous ſtructure is only the particular arrangement of the ſubſtances of the pigment, and not a texture compoſed of different parts, for the whole is ſoluble, or rather miſcible, in water after maceration. The rete mucoſum of the *cetacea* is black upon the ſuperior ſurface of the body, but is a ſilvery white on the belly.

The pigment of the ſkin is found within the cavities of the mouth and noſe in many quadrupeds, in which places it has a dark colour.

The *cutis*, or *true ſkin*, varies of courſe very much in thickneſs in different animals of this claſs: as a general obſervation, we may ſtate that the ſkin is thick in proportion to its nakedneſs, and its expoſure to external friction or preſſure. It is therefore moſt ſtrong in *many-hoofed* quadrupeds, to whom theſe circumſtances belong, as well as great bulk of the animals themſelves. The ſkin is always thickeſt upon the back of the body and outſide of the limbs. The thickneſs of the ſkin may be increaſed to a very extraordinary degree by artificial preſſure, as is ſeen in the *boar pigs* that are uſed for making *brawn*. In theſe animals, the ſkin upon the ſhoulders is ſometimes above an inch thick.

The ſkin is peculiarly tough in thoſe animals that burrow in the ground. In the *mole*, although it is thin, it is ſo tough, that it is difficult to cut it with a pair of ſciſſors.

The ſkin of *cetaceous* mammalia is peculiar in its ſtructure. The ſurface next the rete mucoſum is ſmooth, and when examined under water, floats like a villous texture. We could not readily detect any diſtinct villi upon the ſkin of the *porpoiſe*, or *grampus*, they are ſo fine and ſo cloſe to each other; but Hunter has deſcribed them as being very plain in *whales*. It is ſcarcely poſſible to calculate the thickneſs of the ſkin of *cetacea*, as it is gradually loſt in the cellular texture which contains the oil, but it appears to be peculiarly thin, according to the ſize of the animals, unleſs we conſider the cellular ſubſtance that is filled with the oil as making a part of the ſkin, which appears really to be the caſe. Every part of the ſkin of the *whale* tribe is penetrated by the oil.

The ſkin of *cetacea* appears to be leſs ſenſible of external impreſſions than that of any other ſpecies of mammalia. The ſmoothneſs, and ſtretched ſtate of the cuticle; the thickneſs of the rete mucoſum; the abſence of thoſe ſmall eminences of the cutis called papillæ, which are peculiarly endowed with blood-veſſels and nerves, and the interpoſition of ſo great a quantity of oil in the interſtices of the ſkin and cellular ſubſtance, all contribute to obſcure the impreſſions of foreign bodies.

Certain parts in the other mammalia, from their ſituation, figure, and intimate ſtructure of the ſkin covering them, are fitted to receive peculiar impreſſions, and are, properly ſpeaking, the *organs of touch*. The moſt delicate inſtruments of this kind are, the *hands* of the *quadrumanous* mammalia; the *lips* and *ſnouts* of many quadrupeds; the *prehenſile tails* of *monkies*, *opoſſums*, *ant-eaters*, *pangolins*, &c.

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The under surfaces of the hands and feet of *monkies* are organized like those of the human subject, but have not the nervous papillæ so eminent as they are in the human hand.

The feet of *digitated* quadrupeds also are capable in a degree of the sensation of touch, particularly the under surface of the front toes in the *racoon.*

The lips of many quadrupeds form a very delicate sense of touch. They are largely supplied with nerves and blood-vessels, and the papillæ of the skin are very eminent. The superior lip of the *rhinoceros* forms a process which is moveable in various directions, and is used by the animal as a prehensile member.

The snouts of the *hog*, *mole*, *desman*, and *tapir*, are extremely well constructed for feeling with; being very moveable by the muscles already described, highly elastic in themselves, and their extremity having, like a lip, a papillated surface, which is richly endowed with nerves and vessels. But the proboscis of the *elephant*, as being capable of embracing bodies entirely, in addition to the great sensibility of its extremity, constitutes, perhaps, the most perfect organ of touch with which we are acquainted.

The inferior surface (which is the one applied to bodies) of the prehensile tails of mammalia, is divested of hair, and the skin is papillated as upon the end of snouts, &c. Cuvier states that he found the papillæ very distinctly upon the under surface of the tail in the *Cayenne opossum.*

In some cases, foreign impressions are conveyed by the medium of insensible parts. This may be observed with respect to whiskers, nails, hoofs, and horns, which are intimately connected with parts so extremely sensible, that the slightest impression upon them in an uncovered state would be highly painful. The vascular and sensible substances, which we find clothed by these horny integuments, are better calculated for producing the perception of the mere existence of solid or resisting bodies, than any of the other organs of touch; but are incapable of furnishing any idea of the figure of foreign substances. The insensible integuments and appendages of different animals are described under their proper heads in this dictionary; and there is also a plate allotted to the illustration of their structure and mode of growth.

In the *ornithorhynchus paradoxus* the external branches of the fifth pair of nerves are very large, and are distributed on the integuments of the bill of this curious animal, precisely in the same manner as in the broad bills of the *anserine birds*, and thus produce a very nice organ of touch. See *Anatomy of* BIRDS, in this dictionary.

The peculiar muscles, which move the skin and the organs of touch in mammalia, are already described, along with the other muscles of the body.

The integuments of the wing of the *bats* are so thin, that they are transparent, and permit one to see the distribution of the nerves, which form between the membranes of the wing a beautiful plexus. A contemplation of this structure should have taught Spallanzani and Jurin that *bats*, when flying, must be advertised of the existence of any resisting bodies, on approaching them, by the difference in the impulse of the air upon the concave surface of the wing; and have rendered the cruel experiments of these physiologists upon *bats*, in order to discover their sixth sense, unnecessary. From the first time we dissected this animal, we were convinced that it directed itself altogether by means of the sensibility of the wing. The mode of flying observable in *bats* appears to be perfectly consistent with this notion. They usually proceed as if they had no perception of objects, until they arrive within a near distance of them, when they either suddenly turn aside, or directly round, as if to avoid being dashed against them. Blind men are known to direct themselves by means of the feeling of resistance in the air, on approaching walls or houses, &c.; and even a person, whose sense of feeling has never been practised to discriminate so nicely, can discern the walls in a dark room, on approaching them very nearly, without touching them with any part of the body.

Organ of Taste.—The sense of taste is generally supposed to reside altogether in the tongue; but some substances excite particular tastes, in passing over the inside of the lips and the fauces. The irregular denticulated folds which the lips form in the *cloven-footed* quadrupeds, the *dog*, &c. seem particularly well calculated for receiving the impressions of sapid bodies.

Blumenbach mentions a man who was born without a tongue, yet could discern the taste of sapid substances, when passing over his palate.

The muscular structure and mechanism of the tongue have already been described, under the heads of the *organs of mastication* and the *organs of motion:* it, therefore, only remains to consider some peculiarities in the form of this member, and the organization of its integuments, which alone possess the sense of tasting.

The tongue in the *monkey* kind has not quite the same figure as in man; it is longer and thinner: even in the *ourang-outang* it is three times as long as it is broad. In the *digitigrade* quadrupeds it is long, thin, and flexible: it is so also in the *cloven* and *solid-hoofed tribes.* The *hog* has a short tongue, with the edge divided into a number of processes like fringe. The tongue of the *seal* is thick and short, and has on each side of the point a ragged notch, or deficiency, having the appearance of a piece being bitten off. The singular long-shaped tongue of the *ant-eaters* has been already mentioned, and the mechanism on which it depends described. The tongue of the *cetacea* is short, flat, and smooth, and bears considerable resemblance to that organ in fishes.

The three kinds of papillæ observed in the integuments of the human tongue, *viz.* the *conical*, *fungiform*, and *incupped*, exist in mammalia. Their varieties in different genera relate principally to the form and covering of the conical, and the number of the other sorts of papillæ.

In the *prehensile-tailed monkies* the conic papillæ are but small: they have but three incupped papillæ, which are arranged like the three points of a triangle. The *mandril* (*simia maimon*), and the *simia cynocephalus*, have also three incupped papillæ in the same position. The *simia cynomolgus* has four incupped papillæ arranged in the form of a portion of a circle. The *Chinese monkey* has seven, making an elongated triangle, with two before it in a line. Several other *monkies* have been observed to have fewer incupped papillæ than the human subject.

The tongue of the *common bats* has the conical papillæ very fine and long, somewhat like hairs, particularly on the back part. The inside of the mouth also has some of these papillæ upon it. In the *ternate bat* the conic papillæ are horny, and at the extremity of the tongue are divided into several points.

The whole of the *cat* genus (*felis*) have the conical papillæ, that are on the middle of the tongue, clothed with horny integuments. These are little hooks or claws, sharp pointed, and when on the tongue, are inflected backwards; so that when any of the larger animals of this genus employ the tongue in licking the human hand, they tear off the skin. When the papillæ of the tongue are covered by a horny substance, they seem to be insensible to the impressions of sapid bodies; we therefore find, in the *cat* kind, soft round papillæ interposed between the horny ones, upon the middle

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of the tongue. Thefe two kinds of papillæ are placed alternately in a quincunx order, fo that there is an equal number of both upon the tongue. There are foft, conical, fungiform papillæ upon the edges of the tongue. Upon the back part of the organ the horny papillæ difappear; and there are fome fmall incupped papillæ arranged in two lines, that approach pofteriorly. In the *common cat*, Cuvier ftates that there are on the fides of the back part of the tongue fome fungiform papillæ, which are pendent from long pedicles. The tongue of the *civet* refembles that of the *cat* genus.

In the other *digitigrade* and *plantigrade* quadrupeds the tongue is foft and flexible. The only variations are with refpect to the number and pofition of the incupped papillæ, which are fcarcely worth detailing.

The tongue of the *opoffums* has the anterior and middle part covered with horny fcales inflected backwards, which terminate in wedge-fhaped or rounded edges: the point of the tongue is fringed: there are but three incupped papillæ. The tongue is, however, foft in the *phalangers*.

The *porcupine* has the upper furface of the tongue like that of the other *faltigrada;* but upon its fides, and at the end, there are fome large fcales terminating in two or three points of a wedge-fhape. There are but two large incupped papillæ. The other animals of this order have alfo fewer incupped papillæ than man.

The conical papillæ are fo minute, as to be fcarcely difcernible in the *armadillos* and *Cape ant-eater* (*orycteropus*). Thefe animals have the tongue long, narrow, and very fmooth: they have alfo only two or three incupped papillæ.

In the *American ant-eaters* the tongue is without papillæ, and is therefore not an organ of tafte. Indeed in all the *edentata* or *infectivorous* quadrupeds, this member feems to be merely a mechanical inftrument for taking and fwallowing their prey.

The *floths* have the conic and fungiform papillæ but little developed, and only two papillæ in cups.

The *many-hoofed quadrupeds* have all the papillæ of the tongue fmall.

The *cloven-footed* order of mammalia have the conic papillæ upon about the anterior half of the tongue, terminating in flexible horny filaments. They are bent backwards, and end in a point. In the fmaller *bifulca* the horny coverings of the papillæ are fo fmall, as to be feen with difficulty; but in the larger fpecies, particularly the *camel*, thefe filaments are long, and give the touch of the tongue fomething of the feeling of velvet. The back part of the tongue, in the *bifulca*, is covered by thick tuberculated papillæ, which fometimes are cone-fhaped, and at others femi-fpherical, and which become fmaller towards the fides. The incupped papillæ are numerous, and fituated on the fides of the back of the tongue. They are not eafily diftinguifhed from the fungiform, except in the *camel*, in which they are very large, and concave on their furface.

The conical papillæ are very fmall and compact in the *horfe*, and the fungiform papillæ are confined to the fides of the tongue. There are but three of the incupped papillæ, and the furface of thefe is irregularly tuberculated.

There do not appear to be any conical papillæ on the tongue of *cetacea*. Cuvier ftates that they cannot be obferved, even with a glafs, on the tongue of the *dolphin* and *porpoife*. There are on it fome eminences like pimples, and at the bafe of the tongue there are four fiffures: the edges of the extremity of the tongue form fmall fhreds. Hunter compares the tongue of the large *whales* to a feather bed.

In *Plate* XIII. of the *Anatomy of Mammalia*, *fig.* 1 is a view of the tongue of the *cat: a*, the part covered with the fpiculated papillæ; *b*, the pendent fungiform papillæ; *c*, *c*, the two rows of incupped papillæ. *Fig.* 2 is one of the horny hooks removed from the tongue of the *leopard*, and magnified to about four times the natural fize. *Fig.* 3 fhews the tongue of the *porpoife: a*, the point of the tongue terminating in fhreddy proceffes; *b*, *b*, *b*, the pimple-like eminences upon the upper furface of the tongue.

Organs of Smelling.—The apparatus for receiving the impreffions of odorous effluvia is much more complicated in mammalia generally than in man, which is confiftent with the great excellence of the fenfe of fmelling in many of the former.

The parts of the *ethmoid* bone, which enter into the compofition of the orbits and the parietes of the cranium, have been defcribed in their proper places. The foramina of the cribriform plate, through which the branches of the olfactory nerves pafs, appear to be numerous in proportion to the perfection of the fenfe of fmelling. They are lefs numerous in the *monkey* than the human fubject.

In quadrupeds thefe foramina are of different fizes, and collected into groups. In fome fpecies of different tribes, as the *fheep*, *hog*, *ant-eater*, &c. there is a row of larger holes on each fide of the crifta galli of the ethmoid bone. The *faltigrade quadrupeds* have the feweft foramina in the cribriform lamella, and the *digitigrade* the greateft number of them.

The *cells* of the *ethmoid bone*, as they are generally found in mammalia, are well defcribed by Cuvier. He fays, it is neceffary to imagine a great number of hollow pedicles, all connected to the cribriform bone. They extend forwards and outwards; and, in proportion as they advance, thofe which are neareft unite. Vefícles arife from them, which increafe in fize in proportion as they become lefs numerous: they are all hollow, and there are an infinite number of conduits or ways between them, all of which communicate with each other. The ethmoidal cells are moft numerous in the *carnivorous* quadrupeds, which have the fineft fenfe of fmell. In the *faltigrade* order there are very few of thefe cells. Some genera of this tribe, as for inftance the *hare*, and the *quadrumanous* mammalia, have irregular cells like thofe of the human fubject.

The ethmoidal cells are diftinct from the fuperior turbinated bone in many mammalia. They are fometimes feparated from the reft of the nafal cavity by a particular feptum. This is efpecially to be obferved in the *hog*, where it is produced by a plate of the palatine bones inferiorly, and anteriorly by a procefs of the maxillary bones. It extends to the feptum nafi, and leaves only a narrow paffage above it. In the *carnivorous* tribe and the *horfe* the projection of the maxillary bones is lefs confiderable; but it is fufficient to feparate the ethmoidal cells, which are contained in a depreffion behind it. In the *faltigrade* and *cloven-hoofed* quadrupeds this depreffion is little marked.

The *fuperior turbinated* bone is formed by one of the ethmoidal cells in the *hoofed* quadrupeds. This cell is larger and much longer than the reft, and extends as far as the inferior turbinated bone which it covers.

The *inferior turbinated bones* are much more complicated in mammalia than in man.

Cuvier fays, in the *monkies* of the old continent, they are formed as in the human fubject, but in the *American monkies* thefe bones are made nearly as in the *many-hoofed* and *cloven-footed* quadrupeds.

In thefe two orders the fuperior turbinated bones commence each as a fingle lamina, which foon forms two.

 Thefe

Thefe are coiled upon themfelves in a fpiral manner, and make either two or two and a half turns, according to the fpecies, fo as to produce a fort of horn or concha, clofed pofteriorly in a point. This horn contains two canals; the one above, the other below the principal lamina. The fuperior canal leads to the maxillary finus in the *cloven-hoofed* quadrupeds, and in the *hog* it is continued pofteriorly in a long groove, which ends in a canal that goes into the malar finus. The inferior canal of the concha conducts into the back of the nafal cavity, as in the human fubject.

The turbinated bones are compreffed horizontally in the *hippopotamus,* owing to the fhape of the animal's head.

The laminæ of the turbinated bones are generally in the *hoofed* quadrupeds porous or filled with foramina, which are of various fizes in different fpecies; in fome inftances the holes are fo large and numerous, that the bones form merely an offeous net-work. The *pig*, however, has no foramina in thefe bones.

In the internal part of the turbinated bone there are feveral partitions, which are alfo perforated with vacancies.

In the *folid-hoofed* tribe, according to Cuvier, the horizontal lamina of the inferior turbinated bones does not divide into two, but at firft folds downwards, then bends upwards, and is attached behind to the maxillary bone. It afcends pofteriorly, to cover the opening into the inferior maxillary finus, and even to pafs into it. Laftly, it produces, towards its middle, two or three oblique laminæ, which are attached to the anterior edge of this hole.

The inferior turbinated bones of the *edentata* and *three-toed floth*, very nearly refemble thofe defcribed in the *cloven-footed* quadrupeds. In the *two-toed ant-eater*, however, Cuvier fays, they are like two prifmatic boxes clofed on all parts, and divided internally by fome vertical laminæ. The *lemur* has fimilar bones, but without any divifion anteriorly.

In the *porcupine* and *marmot* thefe bones confift of a double lamina, attached longitudinally; the two parts of which feparate from each other, and afcend by a fpiral convolution, giving the appearance of the periwinkle fhell (*turbo*). The *rat* has the turbinated bones fimilar to thofe of the *cloven-hoofed* quadrupeds. The other *faltigrada* almoft all have thefe bones complicated, as in the *carnivorous* tribes.

In thefe laft the lamina, by which the inferior turbinated bone is affixed, divides into two branches, each of which is again divided. The laft laminæ form a number of canals covered by the pituitary membrane. The air paffes through thefe canals on its way from the noftrils to the lungs, and back again. The *feal* and *otter* have the inferior turbinated bone more fubdivided than any other animals of this clafs. Profeffor Harwood has calculated that the internal furface is equal to 120 fquare inches in each nafal cavity of the *feal*. The laminæ are moft numerous in the *beaver* amongft the *faltigrada*. When there are few laminæ in the *carnivorous* and *faltigrade* orders, the laft laminæ are fpirally twifted in the fame manner as where there are but two in other animals. The *lion* has the lamina divided into two, each of which has a double roll. It is perforated by many foramina. The *civet* and the *viverra genetta* have only the lamina convoluted and without foramina.

The intention of the divifions and convolutions of the inferior turbinated bones, is evidently to extend the furface of the pituitary membrane which is fpread upon them, and as we find this furface, almoft without exception, great in proportion to the acutenefs of the fenfe of fmell, we cannot but fuppofe the olfactory nerve is diftributed to it, although its branches have not yet been clearly traced beyond the fuperior turbinated bone.

The *olfactory* nerve has been already defcribed until its entrance into the nafal cavity. Upon arriving there, its diftribution appears to be exactly the fame both in man and mammalia. Cuvier mentions two branches, which are longer and plainer than the reft, upon the feptum, but thefe appear to us to be branches of the fifth pair of nerves, diftributed to the pituitary membrane for common fenfation.

The *finufes* of the different bones in the neighbourhood of the nafal cavity, more particularly the *frontal* finufes, have been confidered by Blumenbach and others as being fubfervient to the organs of fmelling. We muft confefs, however, that the ufe of thefe parts does not appear to us to be quite determined. The membrane which lines the finufes is not organized for receiving the impreffion of odorous effluvia, and the retention of the latter in the cavities of the finufes does not feem likely to produce much effect upon the pituitary membrane. We may obferve, that when animals wifh to fmell any fubftance particularly, they make fhort infpirations, which is called *fnuffing*. The chief ufe of the finufes, as connected with the organs of fmelling, appears to be to fupply a clear watery fluid for keeping thofe parts moift which are really the feat of this fenfe, for we find, when the fecretion of the finufes becomes infpiffated or fuppreffed by catarrhal inflammation, the fenfe of fmelling is very much impaired.

The *frontal finufes* vary very much in fize and figure, even in the genera of the fame tribe. They are fmall in the *monkey* kind generally, and are even abfent in fome fpecies. Thofe with *prehenfile tails,* on the contrary, have them large. The *bats* want thefe finufes.

In the *digitigrada* they are large, and particularly fo in the *dog* kind, in which they not only occupy the anterior part of the os frontis, but the poft-orbitar proceffes, and each fide of the pofterior parietes of the orbit.

Thefe finufes are very extenfive alfo in moft of the *plantigrada*. The *badger*, and the greater number of the *weafel kind*, want them altogether, but have the poft-orbitar proceffes hollow, and communicating freely with the nafal cavity.

Moft of the *faltigrade* quadrupeds want the frontal finufes; yet in the *porcupine* they are fo large as to pafs into the fubftance of the nafal bones.

In the *edentata* thefe finufes do not exift, in the *ant-eater* and *pangolin*, but the *armadillo* has them of fome fize.

In the *floth* they are very extenfive, reaching nearly to the occiput.

The *cloven-footed* quadrupeds have the frontal finufes in general very large, and in the *ox*, *goat*, and *fheep*, they extend into the interior of the offeous procefs, which fuftains the horn. Cuvier thinks the *ftag* has no frontal finufes. Harwood fays the *deer* want thefe finufes, but have membranous cells between the nofe and internal angle of the eye.

The *elephant* has the finufes correfponding to the frontal of prodigious extent. They give the remarkable prominence of the forehead which this animal poffeffes, and render feveral of the bones of the head hollow. They are divided into a great number of fmaller cells, fo that the texture of the cranium in the elephant has, when laid open, the appearance of a honey-comb, or rather of a fponge that has large cells.

In the *hog* thefe finufes are larger than in any other animal, except the *elephant*. They extend in both thefe quadrupeds as far as the occiput. In the *common hog* and *babirouffa* they are divided by fome laminæ of bone, but do not form that intricate cellular ftructure found in the *elephant*. The *hippopotamus* and *rhinoceros* have no frontal finufes.

Thefe finufes are of tolerable extent in the *horfe*, but are confined

confined to the frontal bone, and in place of opening, as ufual, into the fuperior part of the nafal cavity, communicate on ea h fide, by a large opening, with the pofterior maxillary finus.

The *feal* wants the frontal finufes.

It will be feen, from the above account, that the magnitude of the frontal finufes keeps pace in general, though not conftantly, with the degree of excellence in which the animal poffeffes the fenfe of fmelling, from whence the opinion arofe, which we have already noticed, of thefe finufes being particularly connected with the organ of fmelling.

The *maxillary finufes* are very fmall in many orders of mammalia, as the *digitigrada*, *plantigrada*, the greater number of the *faltigrada*, and *edentata*, and ufually in all the quadrupeds in whom the maxillary bone does not form a floor to the noftrils. They are lefs in the *monkey* and *lemur* than in man in proportion. Generally in the *digitated* quadrupeds, when there is a cavity in the maxillary bone, it is in common with that of the nofe.

Hogs want the maxillary finus, but they have finufes in the malar bone. The *hippopotamus* has likewife a fmall finus in the fame fituation. The maxillary finufes of the *elephant* are cellular, like the others of this animal. The cells communicate, and one of them opens into the nafal cavity.

The *cloven-hoofed* quadrupeds have the maxillary finufes, as well as the frontal, very large. Each finus opens into the nafal cavity, behind the inferior turbinated bone, by a narrow flit.

In the *horfe* there are two maxillary finufes, an anterior and pofterior. The latter is the larger, and forms a projection into the nafal cavity.

The *fphenoidal finufes*, although, from the pofition of the head of quadrupeds, they muft perform the fame offices as the frontal finufes, do not correfpond with thefe laft in regard to fize.

In the *quadrumana*, they are lefs than in man in proportion.

The *carnivorous* tribes have fmall fphenoidal finufes, and fome of them, as the *otter*, *pole-cat*, and *feal*, want them.

They appear to be abfent alfo in moft of the other genera of mammalia. They are found in the *hog* and *hippopotamus*, but of a fmall fize. The *elephant* has them of a very great magnitude. They extend into the pterygoid proceffes of the fphenoid bone. Their interior is not cellular, as the other finufes of the *elephant* are.

The fphenoidal finufes exift in the *horfe*; they open into the pofterior maxillary finufes.

The entrance into the organ of fmelling, is in general compofed of the fame cartilages in man and many mammalia, only differing in form and fize in the latter.

In thofe with *fnouts*, the cartilages make in general a perfect tube. Cuvier thus defcribes the fnout of the *bear*. The cartilaginous feptum is reflected inferiorly as well as fuperiorly; the fuperior alæ bend downwards; they meet on the fides, where they are united by cellular fubftances, and complete the external parietes of each noftril. The edge of each ala continues afterwards to bend inward, and forms a kind of concha, which makes an addition to the inferior turbinated bone, and which is covered, like it, by a prolongation of the pituitary membrane.

In the *horfe*, a great part of the external nares is membranous. The edge of the noftrils contains a femi-lunar cartilage, which correfponds to the inferior cartilage of the human fubject. It has two branches, one is long and narrow, and is nearly parallel to the feptum; the other is fhort, almoft fquare, and fituated in the external ala of the nofe. The reft of the ala is formed by the integuments, which are at firft inflected to produce a foffa, which is known by the name of the *falfe noftril*. The paffage into the real nares is a long flit.

The probofcis of the *elephant* and *tapir* is the moft remarkable prolongation of the external parts of the organs of fmelling. The two external nares are extended into two membranous tubes, which in the *elephant* are of great length. Thefe tubes are inclofed by the complicated mufcular ftructure already defcribed, and the integuments.

The mufcles which move the different parts of the external nares are defcribed along with thofe of the reft of the body.

We have before obferved, that the *cetacea* do not poffefs any olfactory nerves, or apparently any organ calculated for receiving impreffions from odorous fubftances. Yet Mr. Hunter afcribed the fenfe of fmelling to the *fpermaceti whales*, and Cuvier feems to think, that it may exift, in a degree, in a certain cavity and cells which communicate with the Euftachian tube. Thefe are fituated on the lateral parts of the bafe of the fkull, and are partly formed by projections of the bone, and partly by proceffes of ligament. They are very irregular interiorly, and are lined with a thin mucous membrane. Thefe cells communicate with the frontal finufes, by a canal which afcends before the orbit. There is a tolerably large opening from the principal cavity into the Euftachian tube. This laft terminates in the nares. The cellular cavity, therefore, has no direct communication with the nares. There are feveral branches of the fifth pair of nerves difperfed through thefe membranous cells, but there is no reafon for fuppofing that thefe have any fenfibility for odorous fubftances, even if they were fairly applied to them.

The two canals correfponding to the nares, are ufed in *cetacea* for the tranfmiffion of the air to and from the lungs, as thefe animals do not refpire by the mouth; for the larynx, inftead of opening at the back of the mouth, afcends in the form of a pyramid, and is received into a flefhy tube, which is common to the two nares. *Whales*, therefore, can keep the mouth in the water, and fwallow their food, without interrupting their refpiration, and it is to enable them to do fo frequently, that the external opening of the nares is upon the top of the head. The flefhy tube which receives the fuperior part of the larynx foon divides into two canals, which pafs on each fide of the vomer, and are analogous to the pofterior paffages, into the nafal cavity of other mammalia. They are, however, lined by a thin, dry integument, very unlike the pituitary membrane. They afcend in two canals that are formed in the bones of the cranium, feparated by a thin feptum. Where the two canals terminate, they are provided with a flefhy valve in the fhape of two femicircles. This valve is attached to the anterior edge of their orifice, and clofes it by means of a very ftrong mufcle, that is attached to the intermaxillary bones. On the outfide of this valvular opening, there are placed two large, oval, membranous bags. Thefe are lined by a black mucous integument, which appears to be the continuation of the fkin; it is very deeply wrinkled in a relaxed ftate.

A ftrong layer of flefhy fibres arifes in a radiated manner from the circumference of the cranium, and unites upon thefe two bags. The fkin of the head covers them, and there appears externally only a fmall flit of a femi-lunar figure, which is a common opening to the two bags.

It is the ftructure juft defcribed which enables the *cetacea* to expel any water which may get into the pharynx or nafal paffages. This is done with fo much force, that the jet is feen in the larger fpecies at a confiderable diftance at fea. Some *whales* are reported to fpout the water from their blow

blow holes as high as 40 feet. When these animals wish to expel the water from these spiracles, they close the pharynx and larynx by their proper muscles; the larynx retreats from the fleshy tube which embraces it during inspiration, and leaves the passage into the nares free, through which the water is urged to ascend, until it arrives in the oval bags situated on the forehead, which is the upper part of the head in these animals. The valve that guards the opening of the nares into the oval bags is shut, to prevent the retreat of the water; the muscles of the bags contract, and the water is thrown out through the semi-lunar fissure of the skin with extraordinary force.

Fig. 4. *Plate* XIII. of the *Anatomy of Mammalia*, is a section of the anterior part of the skull and upper jaw of the *hog*, in which most of the circumstances in the structure of the organ of smelling are brought into view: *a*, the frontal sinuses, which are very large in this animal; *b*, the sphenoidal sinuses of a small size; *c*, the ethmoidal cells; *d*, the superior turbinated bone; *e*, the inferior turbinated bone; *f*, the passage to the malar sinus; *g*, the septum dividing the ethmoidal cells from the superior turbinated bone.

Organs of Hearing.—The *concha* and *cartilaginous meatus auditorius*, which constitute the *external projecting ear*, are generally much larger in mammalia than in man. Some, however, that burrow in the ground, are deprived of concha, as the *mole* and some *shrews*, the *zemni* and some *mole-rats*. It is also wanting in the *pangolins*, the *ornithorhynchus*, some *seals*, and the *morse*. In the *cetacea*, there are no external parts to the ear. The cartilaginous meatus commences by a very small orifice in the skin, and leads to the membrana tympani.

The concha is large in those mammalia that have occasion to collect distant sounds in the air, as the *bat*, several *cloven-footed* quadrupeds, the *ass*, the *hare*, the *rabbit*, &c. In the fugitive quadrupeds, the concavity of the concha is usually turned backwards; and in those that hunt for their food, it is generally directed forwards. In the *bat* kind, the hollow of the ear is turned forwards, probably for feeling the approach of other bodies in the same manner, as the wings of these animals do. The ears of the *vespertilio spasma* are immoveably fixed in the forward direction, as they are united to each other by their internal edges. The superior part of the external ear being pendulous, Cuvier remarks, is an effect of domestication. The ear of the *elephant* is also pendulous, but not in the same way as in domestic animals; it being only the posterior and inferior part of the *elephant's* ear which hangs down.

In proportion as the ear is found larger than in man, it usually becomes also more elongated in its figure: it is also thinner. It is nearly membranous in the *opossum*.

The *eminences* of the external ear are various in mammalia. The most singular peculiarities are seen in the *bat* kind. That remarkable projection which appears like one concha, contained within another in the *great eared bat*, is the eminence called the *tragus* prodigiously enlarged. This part is also unusually formed in the other species of *bat*. It is forked in the *vespertilio spasma;* notched in the *vespertilio leporinus*, and *v. crenatus*.

The *antitragus* is extended forwards in the *vespertilio molossus*. to the angle of the mouth. It forms an operculum to the ear in some *shrews*, particularly in the *aquatic shrew*, which has the opening into the ear perfectly covered by this means.

Quadrupeds often have the cartilaginous meatus auditórius composed of two pieces; one is joined with the concha; the other is a tube which is connected to the bony meatus by ligament: both pieces have a longitudinal fissure. The design of this structure is to permit the contraction and elongation of the cartilaginous tube of the ear.

In the long-eared quadrupeds also, there is a third cartilage, to which nothing similar exists in the ear of the human subject. It is situated above the cartilaginous meatus; it is flat, and forms no part of the concavity, but merely serves for the attachment of certain muscles. It varies in shape; it is triangular in the *horse;* lunated in the *sheep;* pointed posteriorly, and bilobed posteriorly in the *rabbit*. and rhomboidal in the *dog*. Cuvier, from whom we borrow this account, calls this cartilage the *scutum*.

The external meatus auditorius is long and curiously twisted in the *ornithorhynchus*.

The *muscles* which move the external ear in most quadrupeds are very numerous and complicated; they have received a distinct description along with the other muscles of the body.

The *osseous portion* of the *meatus auditorius* is subject to a good deal of variety with respect to its length and direction. The latter seems to be influenced by the course in which the sounds approach the animal that it is the most concerned to hear. The osseous meatus is singularly formed in the *mole;* it is flattened superiorly and extended on the sides. The membrana tympani, which is very large, constitutes its superior parietes; by this means the *mole* is enabled to collect more perfectly the sounds that arise from the earth.

The *whale* tribe have no osseous meatus auditorius, but the auditory passage is long and serpentine; it is made of cartilages and membranes that allow its being lengthened and shortened.

The *membrana tympani* is extensive in general for the acuteness of the sense of hearing. It is also situated more or less obliquely in those that hear well. In the *mole* it is nearly flat, and forms the bottom of the cavity of the tympanum. It is nearly as oblique, according to Cuvier, in the *otter*, *weasel*, and *badger*. In the *pangolin*, also, it is very oblique. Its position is nearly vertical in many other *carnivorous* quadrupeds. It is nearly vertical, and turned towards the side, in the *hare*, *cavy*, *marmot*, and most of the *cloven-footed* order.

The form of the membrana tympani depends upon the frame of bone in which it is placed. It is generally in mammalia an oval, with the great axis descending obliquely forwards, and the anterior arch less convex than the posterior. In some of the *saltigrada*, the membrana tympani approaches the figure it possesses in man; and in the *mole* it is perfectly round. It has the figure of a trefoil leaf in the *cetacea*.

The osseous frame of the *membrana tympani* is only perfect, according to Cuvier, in the *guinea-pig*, the *paca*, the *seal*, and the *ant-eater*. There is in other instances a greater or less deficiency in the upper part of it. This is often about one quarter of its circumference. In the *elephant* the half of the upper part of the osseous frame is wanting.

In the *cetacea* there is no proper process of bone for a frame.

The membrana tympani has something of the infundibular figure in all mammalia, except in the *mole*, where it exhibits no concavity on the outer surface.

The structure of this membrane appears to be the same in all the class of mammiferous animals. In the larger quadrupeds there is no difficulty in exposing its three layers, and in the *elephant* the muscularity of the middle layer is said to be clearly demonstrable.

The cavity of the tympanum in most mammalia is dilated at the lower part, usually into a semi-oval or semi-spherical cell. Those of each side produce two eminences that are visible upon the lower part of the skull.

They

They are feen even in the *prehenfile-tailed monkies* ; but are moft remarkable in the *carnivorous* mammalia ; they are very large in the *cat* kind, and the *feal*. Thefe protuberances are more or lefs angular in the *floth*, the *cavy*, the *cloven-hoofed*, and feveral of the *many-hoofed* quadrupeds. They are flat in the *mole*, and fo broad as to touch each other. In the *bear* there are no projections vifible. In the *hog* they are elongated, and end in bulbous heads.

The *maftoid procefs* can hardly be faid to exift in mammalia. Its place feems to be fupplied by the dilatation we have juft defcribed. In the *cloven* and *folid-hoofed* quadrupeds, the *hog*, *cavy*, and *guinea-pig*, there is a ftyle-fhaped procefs from the occipital bone, which has been confidered as analogous to the maftoid procefs by fome anatomifts.

The interior of the cavity of the tympanum is, in many genera, more or lefs fubdivided into different parts. A number of the *carnivorous* tribes have a tranfverfe offeous ridge from the frame of the membrana tympani, to which it appears to ferve as a fupport. In addition to this, there is, in the *cat* and *civet* genera, an offeous procefs, that extends from the pofterior inferior edge of the frame of the membrana tympani, to the promontory, and which, being prolonged obliquely, divides the cavity of the tympanum into two unequal parts, that only communicate with each other by a hole. The anterior of thefe two cavities contains the bones of the ear and the foramen ovale. The pofterior cavity is much larger, and holds the foramen rotundum. It feems to correfpond with the large cells of birds.

Cuvier ftates that *prehenfile-tailed monkies* and *ant-eaters* have an additional cell, fituated before the cavity of the tympanum, and that the *floth* has a cell at the root of the zygomatic procefs.

The interior of the tympanum is intercepted in the *elephant* by a number of bony proceffes, which crofs in every direction, and produce a multitude of cells. A fimilar ftructure exifts in a degree in the *guinea-pig*, *marmot*, *cavy*, and *porcupine*, according to Cuvier. The two tympani of the *elephant* communicate by the cellular ftructure of the fkull.

The tympanum has offeous fepta in the *pig* and horned *bifulca*, which divide its cavity into cells like thofe of a ripe fruit.

In the *hippopotamus* the proper cavity of the tympanum opens by a hole into a cellular cavity.

The *feal* and *morfe* have the tympanum very wide, but without fepta.

The offeous part of the *Euftachian tube* in the *cat* and *civet*, is rather a narrow fiffure than a canal ; in the *otter*, *badger*, and *weafel*, &c. it is a hole ; in the *cavy* it is a half formed canal at firft, which is completed in paffing through the petrous part of the temporal bone. In the *elephant* it is a long wide canal.

There is a large membranous fac in the back of the mouth of the *horfe*, in which the Euftachian trumpet ends.

In the *cetacea*, the cavity of the tympanum, as well as the petrous portion of the temporal bone, is diftinct from the reft of the fkull, to which thefe parts are only bound by ligament and periofteum. The tympanum refembles in figure the fea fhell called *bulla*. The part which correfponds to that containing the fpiral cavity in the bulla is, however, folid in the tympanum. This part is more than two inches thick in the *cachalot* (*phyfeter*). This tympanum adheres to the petrous bone by its pofterior extremity, and by a procefs of the anterior part of its thin edge. Cuvier ftates that in the *dolphin*, the anterior procefs of the tympanum alfo afcends to the petrous bone, but in the *cachalots* (*phyfeter*) it does not reach that part. The tympanum of the *cetacea* is rough upon the furface. It is very ponderous, from poffeffing a great quantity of earthy matter, and is lined with a ftrong membrane, which Hunter thought had a cuticle. There is a thick plexus of veffels in the cavity of the tympanum, one part of which is attached, and the other floats at liberty, like the plexus choroides in the ventricles of the brain. The Euftachian tube in *cetacea* is wideft at its commencement from the tympanum, the anterior extremity of which is entirely open. The tube afcends along the pterygoid procefs, penetrates the maxillary bone, and terminates by a valvular opening in the nafal paffage. Both the tube and the cavity of the tympanum communicate with feveral ligamentous cells, which Hunter confidered analogous to the maftoid in fome refpects.

The two foramina which connect the cavity of the tympanum are fo various in their form, that the ufual names of *foramen rotundum*, and *foramen ovale*, would be improper. Cuvier, therefore, has called the firft the *feneftra cochlearis*, and the fecond the *feneftra veftibularis*.

In the *bat*, the foramen of the cochlea is larger than the other.

In the *mole*, they have both an oval figure. There is a hollow offeous bar which gives paffage to fome blood-veffels extended acrofs the feneftra veftibularis in this animal ; it paffes between the branches of the ftapes. A fimilar bar is found in other inftances.

In the *cat* and *civet*, the foramen of the cochlea is almoft twice as large as the veftibular feneftra.

In the *opoffum*, the foramen called oval in the human fubject is round, and the one called round is fmall and irregular. The latter is triangular in the *beaver* and *marmot*, and in the *hare* it is a fmall fiffure. The veftibular foramen in this laft animal is round and large.

The cochlear feneftra is about double the fize of the other in the *calf* and *pig*, and three times larger in the *hippopotamus*. But in the *elephant* it is very fmall and irregularly fhaped. It is larger than the veftibular foramen in the *horfe*.

The two foramina are farther afunder in the *cetacea* than in quadrupeds. The one of the cochlea is the larger. It has an opening for blood-veffels. The lining of the tympanum projects into the cochlear feneftra.

The fame number of *officula auditus* are found in mammalia as in man, with hardly any exceptions. The *ornithorhynchus paradoxus* has only two officula ; the firft correfponds to the *malleus* of other mammalia ; the fecond refembles very much the fingle officulum of birds. Perhaps a mechanifm fimilar, or approaching to this, would be found in fome of the other *edentata*. There have been difcovered in fome of the *cloven-hoofed* quadrupeds one or two fmall bones in addition to the ufual number. Thefe do not appear to be a natural ftructure. We fhall not enter into a minute defcription of the varieties in the form of the bones of the ear, as many of them do not appear to influence the functions of the organ. We fhall only notice the more remarkable peculiarities obferved in the officula auditus, and refer the reader to Cuvier's "Comparative Anatomy," vol. ii. and Mr. Carlile's paper upon the ftapes in the Philofophical Tranfactions for 1805, &c. for a more particular defcription of thefe parts.

The *proceffus gracilis* of the *malleus* is formed into a thin lamina at its extremity in fome *monkies*, and in the *dog* and *cat*. In the two latter, the *fhort procefs* of the malleus is very prominent, and there is another procefs at the inner part of the neck of the officulum, which fupplies the place of the fmall fpine of the human fubject.

In the *mole*, the proceffus gracilis is fo broad as to make the malleus appear nearly fquare.

In the *faltigrada*, the handle of the malleus is very thin. It

It is likewise so in the *sloth*, *ant-eater*, and *pangolin*, and in all these the short posterior process is almost effaced.

In the *seal*, the handle of the malleus is also compressed, and there is hardly any processus gracilis.

In the *cetacea*, the handle of the malleus is different, but its place is in some degree supplied by a tendinous elongation of membrana tympani, which has more of the funnel shape than in the other mammalia, especially on the inner side. This prolongation of the point of the infundibular membrana tympani is inserted into the base of the neck of the malleus. The neck is truncated obliquely, and there is a processus gracilis which is conical and arched in its form.

There is less variation in the forms of the *incus* of mammalia, than in the preceding officulum. The *mole* has the most remarkably shaped incus. Its inferior or stapedian process is very short and small; while the other is very large, oblong, and hollowed posteriorly like a spoon. Cuvier imagines this may be for holding a muscle.

The stapedian process is very long, and the other hardly apparent in the *rat* and *hare*.

The existence of the *orbiculare* as a distinct officulum has been doubted by some anatomists. Blumenbach considers it only as an epiphysis of the incus. He says it is often wanting even in negroes and North American Indians, whose organs of hearing are very perfect: that it is consolidated with the incus in the adult, and that when it is found as a distinct bone it is not a natural structure. It has appeared, however, to us to be too easily separated, and too regular in its figure, for a mere epiphysis of the incus. It is wanting altogether in the *cetacea*. The *bottle-nosed whale*, according to Hunter, has a small bone in the tendon of the stapideus muscle.

There are several varieties in the figure of the *stapes*, which are pointed out by Mr. Carlile, as above-mentioned.

The form of this officulum is most peculiar in the *mole*, and in the *aquatic* mammalia. The former has the branches of the stapes very much arched and far asunder. The base of the officulum is an elongated oval shape. In the *cetacea* the parts corresponding to the branches are so thick and close to each other, that the stapes appears as a solid bone, with a very minute foramen in the middle. The base is small in proportion to the rest of the officulum. In those species we have examined, the foramen was only large enough to admit the point of a pin. Cuvier describes the stapes of the *lamantin* as resembling a twisted cylinder: on one side there is an oblique groove, and the foramen has the appearance of the puncture of a pin. The surface of the base applied to the fenestra vestibularis is very convex. Some approaches to this structure of the stapes has been observed in the *seal*, from whence it has been supposed, that a solid state of this officulum was favourable to hearing sounds communicated through water.

The *muscles* of the bones in the tympanum have not received as much investigation as they merit, either in man or animals. The same number appear to exist in mammalia as in man, with the exception of the *cetacea*, which seem to want all the muscles inserted into the malleus. They have, however, the *stapideus* muscle. Cuvier says, it is inserted very far up, and not in the middle of the branch of the officulum, as in man.

The *labyrinth* consists of the same parts in mammalia as in man. The *semi-circular canals* were at one time not supposed to exist in the *cetacea*. They are so extremely small that they even escaped the notice, for a long time, of so accurate an anatomist as Camper. In the *porpoise* we have found them just large enough to admit a bristle to pass in them. The extreme hardness and brittleness of the petrous bone in *cetacea*, are additional reasons for these canals remaining undiscovered, and stand in the way of investigating all the parts of the organ of hearing in these animals. This bone, and indeed the tympanum also, in *cetacea*, are as dense and weighty as common stone, and when dried are very easily broken in all directions. The petrous bone is not united, even by suture, with any of the other bones of the cranium, but is retained by ligament and periosteum in a vacancy formed principally in the occipital bone.

The *mole*, whose organ of hearing, in many respects, is formed upon an opposite plan to that of the *cetacea*, is distinguished by the extent of the semi-circular canals, and these are plainly seen on the inside of the cranium, from not being imbedded in a bone harder than the rest of the cranium, as usual in other cases.

Some mammalia are remarkable for the great size of their *cochlea*, in proportion to their parts of the ear. The *bats* have it of the greatest relative size. Cuvier states, that the *horse-shoe bat* has the diameter of the cochlea ten times greater than that of one of the semi-circular canals. The cochlea is visible in this genus on the lower part of the cranium, generally where its form is distinctly exhibited without any dissection of the temporal bone. It bears a perfect likeness to the snail-shell. The semi-circular canals are visible on the internal part of the cranium. There is no petrous portion, properly so called, either in the *bat* or the *mole*, except what constitutes the labyrinth itself. In the *hare-lipped bat*, according to Cuvier, the cochlea projects on the inside of the cranium.

In most of the *carnivorous tribes* of mammalia, the cochlea is larger in relation to the semi-circular canals than it is in the human subject. It is, likewise, so in the *hog*, *elephant*, and *horse*. On the contrary, the relative size of the cochlea to the canals, is less in the *mole* and *hare* than in man.

In general, the cochlea forms two turns and a half in mammalia, as in man. But the *guinea-pig*, *cavy*, and *porcupine*, have three turns and a half. Their cochlea has a pyramidal figure, and makes a projection into the cavity of the tympanum.

The cochlea of *cetacea* is very peculiar. It is large, but only forms one turn and a half, which is nearly in the plane of its axis. The osseous *lamina spiralis* is divided throughout its length by a very narrow fissure into two parts. That which touches the axis is three times larger than the other. The fissure is only completed in the recent state by a membrane.

The osseous part of this septum also, which touches the axis, has under its base, and in the scala of the tympanum, a small canal, which follows the same curvature from one extremity of the cochlea to the other. This canal appears like a third *scala* to the cochlea, but it differs in the circumstance of its capacity increasing as it proceeds in the cochlea; it is widest at the apex. Cuvier observes, that there is a similar canal, though much smaller, in the *cloven-hoofed* quadrupeds. In the other mammalia, only the part of the lamina spiralis which touches the axis is osseous, as in man.

According to Cuvier, the *dog*, *sloth*, *elephant*, *horse*, *dolphin*, &c. resemble man in having the scala of the cochlea that goes to the tympanum rather larger than the other. It is much greater in the *bat*. The scala that leads to the vestibulum, is the larger in the *calf*, *goat*, *sheep*, *hare*, *cat*, *guinea-pig*, *rat*, &c.

The *aqueducts*, as they are called, appear to exist in all mammalia. They have been observed to be very large in the *dolphin*.

The figures which illuſtrate the organ of hearing, are found in *Plate* XIII. of the *Anatomy of Mammalia*.

Fig. 5. repreſents the under ſurface of the ſkull in the *mole*, the lower jaw being removed : *a* is the flat dilatation of the cavity of the tympanum, analogous to the maſtoid cells, ſeen externally on the left hand ſide : *b* is the round, level, membrana tympani, expoſed on the other ſide by the bone being cut away : *c*, the oſſeous meatus auditorius. *Fig.* 6. ſhews an undiſſected view of the bone, containing the organ of hearing in the *grampus*, removed from its connections with the ſkull : *a*, the bone which forms the tympanum : *b b*, the extenſive ſlit-ſhaped opening into the cavity of the tympanum, and which has been compared to the aperture of the *bulla* ſhell : *c*, the irregular trilobed ſpace left for the attachment of the membrana tympani : *d*, the part of the petrous bone containing the labyrinth. *Fig.* 7. is a view of the malleus of the *mole*. *Fig.* 8. ſhews the ſame bone in the *hare*. *Fig.* 9. is the ſhort, thick malleus of the *grampus*, with the membrana tympani attached to it : *a*, the oſſiculum : *b*, the infundibular membrana tympani, with its elongated point inſerted into the neck of the malleus. *Fig.* 10. gives the ſhape of the incus in the *mole* : *a* is the hollow proceſs of the bone. *Fig.* 11. is the incus of the *grampus*. *Fig.* 12. exhibits the ſtapes of the *mole* in ſitu : *a*, the oſſiculum : *b*, the oſſeous bar that croſſes the feneſtra veſtibularis between the branches of the ſtapes : *c*, *c*, are the ſurrounding parts of the temporal bone left in the diſſection. *Fig.* 13. gives a ſide view of the ſtapes in the *grampus*, in which is ſhewn the ſmall aperture that correſponds to the ſpace left between the limbs of that bone in other mammalia. *Fig.* 14. is a view of the lower part of the interior of the cranium in the *mole* : *a* indicates the labyrinth as it appears, without any diſſection of the bones of the cranium : *b*, the ſemi-circular canals and cochlea expoſed, by cutting away ſome part of the cranium, which is very looſe and cellular in its texture, adjoining the oſſeous labyrinth in this animal. *Fig.* 15. is a repreſentation of the oſſeous labyrinth of the *bat*, removed from the ſkull, and a little magnified : *a*, the ſemi-circular canal : *b*, the very large cochlea : *c*, the foramen cochlea feneſtra : *d*, the veſtibular feneſtra. *Fig.* 16. exhibits the turriculated cochlea of the *guinea-pig*, laid open on one ſide, to expoſe the three turns and a half made by it in this animal. *Fig.* 17. ſhews the cochlea and part of the ſemi-circular canals of the *grampus*, excavated from the petrous bone : *a*, *b*, the two tubes which form the cochlea : *c*, *d*, parts of the ſemi-circular canals expoſed and laid open in making the ſections of the bone in which they are incloſed : *e* is the portion of the petrous bone left in the diſſection. *Fig.* 18. ſhews the entire cochlea of the *whale*, abſtracted from all ſurrounding bone ; at the extremity are ſeen the openings into the two tubes of the organ. *Fig.* 19. is a lateral view of the ſame cochlea : *a*, *b*, are the two ſmall openings of the cochlea ; *c* is the beginning of a ridge which divides the entrance of the cochlea : *d*, the tube, which appeared to Camper to contain a nerve.

Organs of Viſion.—The eye is compoſed of the ſame coats and humours in mammalia as in the human ſubject. The comparative anatomy of the organs of viſion in this claſs, relates to varieties in the ſtructure of particular parts, with a deſcription of a few appendages to the eye, that do not exiſt in man.

There is ſome diverſity in the external figure of the eye-ball in different mammalia. Agreeable to a general principle already laid down, it is more globular, or the anterior part is more gibbous, in proportion to the tenuity of the medium, through which the animal beholds objects. We therefore find that eyes of the *aquatic* mammalia are moſt flat upon the anterior ſide, in which circumſtance they approach in form the eyes of fiſhes.

The departure from the ſpherical form of the eye is indicated by a table publiſhed in Cuvier's "Comparative Anatomy," in which the length of the axis is compared with that of the tranſverſe diameter of the eye. We ſhall extract the following examples.

	Axis.		Tranſverſe Diameter.
Man - - -	1	to	1
or, to be more accurate	137	:	136
Monkey - - -		the ſame	
Dog - - -	24	to	25
Ox - - -	20	:	21
Horſe - - -	24	:	25
Porpoiſe, meaſured externally	2	:	3
Whale, meaſured internally	6	:	11

Both the permanent and changeable forms of the eye-ball depend neceſſarily upon its external parietes, which are the ſclerotic coat and cornea.

The *ſclerotic coat* has the ſame texture, and proportionate thickneſs of its different parts, in mammalia generally as in man. There are, nevertheleſs, ſome ſtriking exceptions to this obſervation in the *aquatic* tribes. The ſclerotic of the *ſeals* is thick and firm at the anterior, and ſtill more ſo at the poſterior parts of the eye ; but around the middle this coat is very thin and pliant. This change of the ſtrength of the coat is not, however, abrupt. Blumenbach attributes to this ſtructure the power of accommodating the form of the organ to the different media in which theſe animals reſide. The cornea of the *ſeal* tribe is alſo thin and yielding, and the muſcles which act upon the eye-ball are ſtrong. The reſult of all theſe circumſtances is, that the creature can elongate and ſhorten the axis of the eye according to the occaſion, and thereby adapt it to viſion in the two media of air and water.

D'Albus has diſcovered a ſimilar conformation of the ſclerotic in the *walrus*, in which it is alſo obviouſly intended to anſwer the ſame purpoſes.

The ſclerotic coat of the eye in *cetaceous* mammalia is very peculiar. It is prodigiouſly thick at the poſterior part ; in the larger ſpecies about an inch and a half ; in the *grampus* about $\frac{3}{4}$ths of an inch ; and in the *porpoiſe* two or three lines thick.

It gradually declines until it arrives at the cornea, where it poſſeſſes the ordinary thickneſs of the ſclerotic, in proportion to the ſize of the animal. The compoſition of this coat is equally curious with its form. Upon dividing it, we find a multitude of ligamentous fibres paſſing through it in all directions, and forming an inextricable plexus, which contains in its meſhes a brown fungous elaſtic ſubſtance. A ſection of the ſclerotic has very much the appearance of that of tanned leather, only that it is paler. The coat is looſer in its texture, and ſofter quite at the back part, than on the ſides of the eye-ball. The meſhes there contain an oily ſubſtance. The ſheath of the dura mater, which contains the optic nerve, is neceſſarily very long, and is very eaſily demonſtrated in the *cetacea*. The fibres which enter into the compoſition of the ſclerotic are ſeen to depart from the external part of the ſheath, which fact has been taken as the proof of the ſclerotic coat being, in all caſes, a production of the dura mater, as ſuppoſed by the ancient anatomiſts. The ſclerotic of the *whale* kind, by its great firmneſs, defends the internal parts of the eye from preſſure, to which they would otherwiſe be ſubject, from the ſhallowneſs of the orbits. The form of the internal part of the organ is alſo altered to nearly an oval, although the external figure is ſpherical.

The *tranſparent cornea* generally reſembles that of the human ſubject in the claſs of mammalia. The *porcupine* and *opoſſum* have this part large, and forming the ſame ſphere with the ſclerotic. Blumenbach ſays the cornea of the *porcupine* extends over half the globe of the eye.

The diſtinction between the cornea and the ſclerotic, which is generally but an apparent change of ſtructure, is very clearly to be traced in ſome of the large animals, in which theſe two coats can be ſeparated. In the *whales* and the *rhinoceros*, the attachment of the ſclerotica to the cornea is by the fibres of the former paſſing into the latter. In the *ox*, &c. the line of ſeparation can be ſeen to be oblique, the cornea paſſing a little under the edge of the ſclerotic. In the *hare* and others, the edge of the ſclerotica is double, and embraces on both ſides the margin of the cornea.

The *tunica conjunctiva* is, eſpecially in the large quadrupeds, leſs adherent to the eye-ball than in man. Mr. Pierce Smith has profeſſed to trace not only the conjunctiva, but the expanſion of the ſtraight muſcles over the cornea. The plaineſt evidence of the continuation of the conjunctiva over the front of the cornea is found in the *zemni rat* (*mus typhlus*), which has the conjunctiva retaining the ſtructure of the true ſkin, and even covered with hair, ſo that the eye is altogether uſeleſs, or at moſt can faintly diſcern the difference between light and darkneſs. The eye of this animal is ſaid to be not larger than a poppy ſeed. In the *mole*, alſo, the eye is extremely minute, and ſo much ſhut in by the hair on the eyelids, that it does not appear to be capable of ſeeing any object diſtinctly: indeed the eyes of the *mole* are ſo much concealed, that they are ſuppoſed by common people to be wanting altogether.

In the *whale* and the large quadrupeds, the diſtinction of the two layers of the *choroid coat* is very perceptible. The internal layer, or *membrana Ruyſchiana*, is particularly plain in the *whale*.

Mr. Thomas has diſcovered a moſt curious apparatus connected with the choroides in the *Eaſt Indian rhinoceros*. Four tendinous proceſſes ariſe from the back part of the ſclerotic coat, expand anteriorly, and form a ſpecies of muſcular membrane, which is loſt in the choroides at the broadeſt diameter of the eye-ball. It is eaſy to conceive that this ſtructure can produce material alterations in the figure of the eye, and in the diſtance of the cryſtalline lens from the retina, but we cannot conceive why ſo great a power of adjuſtment in the eye to different diſtances ſhould belong excluſively to this animal.

The *pigment* of the internal ſurface of the membrana Ruyſchiana is of various colours in mammalia, particularly on the back of the eye. The *monkey* has it dark coloured. The *hare*, *rabbit*, and *hog*, have it a brown: but in many other mammalia the pigment upon the back of the eye has light and vivid colours. It is called, in theſe caſes, the *tapetum lucidum*. The *ox* has the back of the eye a green, which is loſt in an azure blue. In the *ſheep* it is a pale yellow-green, or ſometimes blueiſh. Some anatomiſts, who ſeem to have confined theſe obſervations to thoſe two caſes, have conjectured that the uſe of the tapetum is to reflect the natural colour of the animal's food. But the abſurdity of this opinion is ſhewn by the varieties of the colour of the back of the eye in other animals.

The tapetum is a ſilvery blue, changing to violet in the *horſe*, *goat*, *buffalo*, and *ſtag*. It is a pale golden yellow in the *lion*, *cat*, *bear*, and *dolphin*. It is a pure white, terminating in blue, in the *dog*, *wolf*, and *badger*.

The ſhape of the coloured portion of the Ruyſchian coat is irregular, and is ſituated chiefly upon the temporal ſide of the entrance of the optic nerve: but in the *whales* the whole of the Ruyſchiana is a ſilver colour; the ciliary proceſſes and back of the iris alone being dark. The uſe of the tapetum is not very obvious. The moſt probable opinion reſpecting it is, that it enables animals to ſee better in the dark.

The *ciliary proceſſes* do not appear to differ in their ſtructure in this claſs and in the human ſubject. It is true they are very prominent in the large ſpecies, and the denticulation of their edges is ſo much increaſed, as to form a rich fringed appearance, particularly in the *rhinoceros* and *whale*. The laminæ of theſe proceſſes are long and narrow in the *cat* kind, more eſpecially in the *lion*.

Mammalia have the *iris* uſually of a more uniform colour than in man. In *domeſtic* quadrupeds, however, there is conſiderable variety in this reſpect. The colour of the iris correſponds ſo much with that of the hair, that in *ſpotted dogs*, &c. the iris is often of a mixed colour.

In the large mammalia the iris is of conſiderable thickneſs, but no difference of ſtructure has been perceived.

The *uvea* is found much more plain in the *ox*, *rhinoceros*, and *whale*, &c. than in man, and the ſtriæ that are continued upon the uvea from the ciliary proceſſes, are very diſtinct in theſe ſpecies. They extend in the *rhinoceros* nearly to the edge of the pupil.

The *pupil* of the eye has various forms in ſome mammalia.

It is in the *cat* kind a vertical ſlit, over which theſe animals have great command, ſometimes contracting it to a mere line, and at others dilating it to nearly a round figure. In the *cloven-hoofed* order, the pupil is a tranſverſe ſlit, with the ends of the ſlit wider than the middle. In the *horſe* it is alſo tranſverſe, but the ſuperior edge projects a little way. This has been compared to the curtain that hangs over the pupil in the *ſkate* by Swammerdam, although there is but little reſemblance between the two parts.

It is a tranſverſe oblong aperture in the true *whales*, and in the genus *delphinus* it is a heart ſhape.

The *retina* is formed uſually in the ſame manner in mammalia as in man. It ſometimes happens that the *optic nerve*, immediately on entering the cavity of the eye, forms a ſlight projection. In the *hare* and *rabbit*, this projection is deſcribed as producing a kind of oval cupola, which is ſlightly concave in the middle. The retina ariſes from the edge of it. The fibres of the nerve are condenſed on each ſide into two ſtreaks or pencils, which are a more opaque white than the other parts of the retina. In almoſt all mammalia the retina has at its origin the appearance of its ſubſtance being collected into folds, or fibres, which ariſe in a radiated manner.

Comparetti ſtates, that the optic nerve of the *bat* perforates the ſclerotic coat by a number of foramina. The filaments, thus formed, unite to produce the retina.

The *foramen* of the retina, which uſually takes the name of Sömmerring, has not been found in any of this claſs, except the *monkey* tribe. Cuvier ſtates, that he found it in the *cynocephalus* conſiderably larger than in man, and of an oval ſhape.

It is ſingular, that although this foramen does not exiſt in the *lemur*, yet the fold which contains it in man and the *monkey* is found. The uſes of the foramen of Sömmerring are not yet determined. Mr. Home imagined that it gave exit to an abſorbent veſſel; but it is much more probable that its exiſtence is connected with the poſition of the eyes, as it is only met with in thoſe that have the eyes placed ſo that their axes are parallel. Blumenbach obferves, upon this fubject, that when the two eyes are fituated, as in man and the *monkey*, they are liable to be both dazzled at the fame time, by an expofure to a ftrong light, as the rays fall upon the correfponding principal focufes of both eyes at once. He concludes, that the foramen of Sömmerring being in the principal focus, the rays pafs through it, and are fuffocated in the pigment of the choroid coat. But to produce fuch an effect, without weakening vifion at all times, would require a mufcular power to open and fhut the foramen according to circumftances, nothing of which kind appears to be provided.

The *aqueous humour* of the eye would appear to be in lefs quantity, according to the bulk of the organ in mammalia, than in man.

The *cryftalline*, on the contrary, occupies lefs fpace in proportion to the other parts in man than any of the mammalia. It is alfo more of a fpherical figure in all this clafs than it is in the human fubject. Blumenbach ftates, that he found the cryftalline to be largeft in relation to the vitreous humour in the *Virginian opoffum*. We felect the following inftances from a table founded on the obfervations of Petit and Cuvier, to fhew that there is a fcale, from man to the *cetacea*, with refpect to the form of the cryftalline, by which it will be found, that the lens is leaft fpherical in the human fubject, and moft fo in the aquatic mammalia.

The axis of the cryftalline is to the tranfverfe diameter,

In *Man*, as	-	-	1 to 2 generally.
Monkey	-	-	the fame.
Ox -	-	-	5 to 8
Horfe -	-	-	2 : 3
Dog -	-		7 : 9
Hare -			4 : 5
Otter -	-	-	4 : 5
Porpoife	-	-	9 : 10
Whale -	-	-	13 : 15

In the *cetacea*, therefore, the lens is nearly a perfect fphere, as in fifhes.

The *vitreous humour* of man is more abundant, in proportion, than that of mammalia. Thus, the human vitreous humour is twenty times larger than the aqueous, while, in the *ox*, it is only ten times as large, and in the *fheep* but nine times the fize of the aqueous humour.

The *oblique mufcles* of the eye-ball do not differ from thofe of the human fubject; but the *ftraight mufcles* are more numerous, except in the *monkey* kind. In many there is but one additional mufcle, which enclofes the back of the eye and the optic nerve, as if in a funnel. It arifes, like the other recti mufcles, from around the optic foramen, and is inferted into the fclerotic behind them. This mufcle is called the *fufpenfory*, *choanoid*, or *retractor* of the eye.

The fufpenfory mufcle is divided into four flips, or, as fome might ftate it, there are four additional ftraight mufcles in moft of the carnivorous mammalia, and the *cetacea*.

In the *rhinoceros* there are only two portions correfponding to the fufpenfory mufcles.

In all mammalia, we find the four recti mufcles as in man, independently of the fufpenfory above-mentioned.

The *third eye-lid* is confiderably developed in many quadrupeds. It is ufually femi-lunar in its figure. In the *hare*, *rats*, *agouti*, &c. its free edge is convex. In many cafes, it contains a thin cartilage, which, from a fuppofed refemblance to a nail, is called *unguis*. This cartilaginous plate is broad and triangular in the third eye-lid of the *hare*. There is almoft always a row of pores upon this eye-lid, which difcharge an unctuous fluid. The third eye-lid is large in the *cat* genus, the *opoffum*, the *feal*, and particularly fo in the *elephant*.

There is no trace of the third eye-lid in the *cetacea*, and the two ufual eye-lids are fo much thickened by the adipofe fubftance, that they have fcarcely any motion. They feem half clofed, but, we believe, are never completely fhut, the conftant refidence of thefe animals in water not making it neceffary.

The *lacrymal gland* exifts in mammalia, except the *cetacea*.

In the *hare* and *rabbit* it is extremely large. It nearly encompaffes the eye, and even paffes out of the orbit on the fide of the nofe. Cuvier thinks it has but one excretory duct.

The lacrymal gland in the *cloven-hoofed* quadrupeds is divided into two or three maffes. Some feparate grains have each a very fhort excretory duct.

The *puncta lacrymalia*, and the *nafal duct*, for carrying off the tears, have been obferved in the *bifulca*, *hog*, *floth*, and *ant-eaters*, &c. and probably are to be found generally. Camper, however, denies the *puncta lacrymalia*, *lacrymal fac*, and even the *os unguis* to the *elephant*. Some anatomifts have confidered cells below the internal angle of the eye in the *deer* and *antilope* genera as receptacles for the tears; but thefe foffæ, as already mentioned, in defcribing the excretory glands, have no connection with the lacrymal paffages and contain an unctuous matter.

In the *hare* and *rabbit*, the puncta lacrymalia are fupplied by a femi-lunar fiffure, which is placed under the inferior edge of the third eye. The border of this flit is provided with cartilages to keep it open. There is a fingle lacrymal duct, and a fmall valve in the canal, to prevent the tears returning upon the eye. There is no apparatus for the fecretion of tears in the *cetacea*. Thus, conftant refidence in the water is fufficient to keep their eyes moift.

In many mammalia there is an additional gland to the eye, which, from an anatomift that defcribed it, has been called *glandula Harderi*. It is placed near the inner angle of the eye-lids, and difcharges its fecretion, which is a thick unctuous fluid, through an opening under the third eye-lid. The glandula Harderi confifts of fmall lobes, and refembles very much the true lacrymal gland in its ftructure. There would feem to be two glands of this defcription in the *hare*, one is a white colour, the other red; but both apparently have the fame ftructure. They are connected by cellular fubftance. This gland is large and double in the *water rat*. It is fingle, oblong, and hard in its texture in the *cloven-hoofed* quadrupeds. It has been found oval in many others. There are fome fetaceous follicles under the upper eye-lid of *cetaceous* mammalia, which probably fulfil the fame purpofes as the glandula Harderi.

In *Plate* XIV. of the *Anatomy of Mammalia*, *fig.* 1. exhibits a fection of the eye of the *feal*, in the direction of the optic nerve: *a* is the anterior part of the fclerotic coat, which is thick; *b*, the pofterior part, ftill thicker; *c*, the middle portion, which is thin; *d*, the cornea; *e*, the optic nerve; *f*, the vitreous humour; *g* is the cryftalline lens, which is feen to approach the figure of a true fphere. *Fig.* 2. reprefents a fimilar fection of the eye in the *grampus*: *a* is the optic nerve paffing in the canal formed in the fclerotic coat at *b b*. That coat is alfo fhewn to derive its white fibres from the fheath of the optic nerve; *c*, the cornea; *d*, the ciliary proceffes; *e*, the membrana Ruyfchiana; *f*, the choroides. Its two layers are a little feparated, to fhew them more diftinctly. *Fig.* 3. is a view of the interior of the front of the eye in the *ox*, produced by the vertical fection of the organ: *a*, the divided coats; *b*, *b*, the fringed ciliary proceffes; *c*, *c*, the ftriæ of the uvea; *d*, the tranf-

verfe

verſe pupil. *Fig.* 4. is the front of the eye in the *cat*, with the cornea removed, to ſhew the vertical ſlit produced by the pupil in this genus. *Fig.* 5. is a ſimilar preparation of the eye of the *porpoiſe*, to ſhew the figure of its pupil. *Fig.* 6. is a view of the eye-lids in the *hare*, with the aperture into the lacrymal duct: *a*, *b*, the upper and lower eye-lids; *c*, the third eye-lid; *d*, the fiſſure correſponding to the puncta lacrymalia. *Fig.* 7. exhibits the glands of the eye in the *hare*: *a* is the lacrymal gland; *b*, the white glandula Harderi; *c*, is the red-coloured one.

Weapons and Organs of Defence.—There is no animal ſo unprovided with the natural means of protection or defence as man. His ſtrength and his ſecurity depend upon the ſocial inſtitutions eſtabliſhed by his ſpecies. It is true many of the mammalia are not furniſhed with natural arms, but in place of them, they are endowed with great ſwiftneſs of foot, and an acute ſenſe of hearing, as may be obſerved in almoſt all the *ſaltigrade* quadrupeds, and others which are purſued by the beaſts of prey. Some fugitive animals ſeek ſecurity in concealment, as the *digging* and *diving* quadrupeds, for example the *mole*, the *duck-billed* animal, &c.

The various coverings of mammalia, ſuch as *hair*, *hoofs*, *ſcales*, *ſpines*, &c. not only ſerve to ſhelter quadrupeds from the inclemency of the weather, but from the attacks of hoſtile animals. The ſtrong tough hair of the *ant-eaters* and *ſloth*, the ſcales of the *pangolin*, the ſpines of the *hedgehog* and *porcupine*, and, moſt of all, the bands of the *armadillo*, are well calculated for this purpoſe.

Thoſe quadrupeds that have defenſive integuments, have generally the power of rolling themſelves up, ſo as to conceal the head, feet, and under parts of the body, which are commonly unarmed. The muſcles that are deſigned for the contraction of the body, are deſcribed with the other organs of motion.

The moſt powerful weapons of mammalia are their horns, their teeth, and the hard ſubſtances with which their toes are armed. The ſtructure and growth of each of theſe parts are deſcribed in their proper place.

The horns are generally employed as the means of *defence*, and chiefly belong to quadrupeds that are gregarious and inoffenſive, unleſs much irritated, or during thoſe periods in which they are under the excitation of the ſexual or parental inſtincts.

The teeth are the weapons moſt commonly employed by animals; almoſt every quadruped may be provoked to make uſe of them; even man himſelf, in thoſe ſtates of ſociety where rules of combat are not acknowledged, always reſorts to his teeth, when preſſed by an adverſary. As the teeth are the moſt general weapons of animals, they are alſo the moſt deſtructive in the operation; when any animal kills another, it is moſt commonly by means of its teeth. The large teeth called *tuſks*, although generally incapable of being employed in any other way than as weapons, are leſs dangerous than the ſmall front teeth of many animals. Some tuſks, although ſo formidable in their appearance, are very harmleſs in fact. The tuſks of the *babirouſſa* are ſo much turned backward, that they cannot inflict a wound, and thoſe of the *elephant* and *mammoth* ſeem incapable of injuring a ſmall animal. The tuſks of the *narwhal* are ſaid to be terrible weapons, which their direction, length, and pointed figure render very probable; there being alſo ſo frequently one of them wanting, it is likely that it may have been loſt in combat.

The feet of quadrupeds are amongſt their moſt effectual weapons when they are furniſhed with claws, as in moſt of the beaſts of prey. The ſtrength of the limbs in all predaceous quadrupeds has already been remarked. The mechaniſm of their feet, by which the claws are inverted by the very act of graſping any object, is ſingularly uſeful to thoſe animals.

Some of the mammalia poſſeſs a great ſecurity from the aſſaults of others, in certain excretions produced by peculiar glands, ſituated commonly in the neighbourhood of the anus. Theſe excretions have a diſagreeable ſmell, which is probably particularly offenſive to thoſe animals they are intended to repel. Some of the American ſpecies of *viverra* are ſaid to occaſion ſo ſtrong a fœtor by the expulſion of the contents of their anal glands, that it is diſcerned at the diſtance of two miles, and cannot be immediately approached by any perſon without the greateſt danger. The organs which furniſh theſe fœtid matters are deſcribed along with other *excretory* glands.

Organs of Voice.—The *monkey* tribe, which have in moſt parts of their anatomy ſo ſtrong a likeneſs to the human body, have many ſtriking and important peculiarities in the organs of voice, ſome of which are even poſſeſſed by the *ourang-outang*.

This animal has the *arytenoid cartilages* ſmaller, and the *cuneiform* ones larger than in man. The *cordæ vocales* are looſe and ſharp upon the edge. The ventricles of the glottis are large oval cavities, and partially divided by a partition. The ſuperior part of each ventricle leads into a hole, which is ſituated between the thyroid cartilage and the os hyoides, and is the opening of a large membranous ſac. Theſe two ſacs lie under the ſkin of the throat, and are in contact with each other, and deſcend towards the cheſt. Theſe ſacs, in ſome individuals, are of different ſizes according to Camper's obſervations. Blumenbach found the right ſac three inches long and two inches round, and the left only the bulk of a nutmeg in the *pigmy ape* (*ſimia ſylvanus.*)

In many other *monkies* there is one large pouch or membranous ſac, which communicates with the glottis. This ſac has been deſcribed by Camper in the *Barbary ape* (*ſimia inuus*), and the *common baboon* (*ſimia ſphinx*). The opening from the glottis in theſe caſes is in the middle, at the root of the epiglottis, immediately above the thyroid cartilage. Vic d'Azir alſo diſcovered the ſame kind of ſac in the *ribbed-noſe ape* (*ſimia maimon*), in which it is very large, and has a round opening under the epiglottis. Cuvier found a ſimilar laryngeal ſac in the *hare-lipped ape* (*ſimia cynomolgus*), and a very large one in the *ſimia veter*. It has been deſcribed in the *varied ape* (*ſimia mona*); but Cuvier denies there being any appearance of it in this ſpecies, and even of the hole or depreſſion at the baſe of the epiglottis, which exiſts in ſome *monkies* that do not poſſeſs a laryngeal ſac, as in the *great baboon* (*ſimia hamadryas*), the *red ape* (*ſimia rubra*), and the *Chineſe ape* (*ſimia ſinica*).

In the *ſilky monkey* (*ſimia marikina*), the laryngeal ſac has its opening between the cricoid and thyroid cartilages.

The *howling baboon* (*ſimia beelzebul*), and the *ſimia ſeniculus*, have the laryngeal ſacs incloſed in a bony caſe, which is hollowed out in the os hyoides. Camper deſcribed but one ſac, which he ſtated to communicate with the larynx by an aperture between the os hyoides and the thyroid cartilage. Vic d'Azir alſo found but one ſac, which he deſcribed as being of an irregular pyramidal figure, ſituated under the tongue between the two branches of the lower jaw, with its pointed part forwards, and divided interiorly by ſeveral thin projections of bone. It had a wide opening poſteriorly, above which was placed a bony plate, with two projections at its two extremities. The opening of of the fac communicated with a large, firm, membranous tube, which proceeding horizontally backwards, terminated in the larynx between the alæ of the thyroid cartilage, fo as to form a communication with both the ventricles of the glottis. The thyroid cartilage was remarkably large, and projected downwards: from its cornu on each fide there paffed a ligament to the two projections of the bony fac. The thyroid cartilage had a projection where it terminated, which feemed to divide the canal leading from the bony fac into two channels: fuch is the defcription given by Vic d'Azir of the organ of voice in the *howling baboon*. Cuvier, however, ftates, that in the *fimia feniculus* each ventricle leads into a membranous fac, which glides between the epiglottis and contiguous ala of the thyroid cartilage, and proceeds towards the os hyoides. In the individual which he diffected, the right fac alone occupied almoft the whole of the cavity in the os hyoides; the left terminated at the moment when it was to enter that bone: but he conceives, that in other individuals, the facs were of equal fize, or that the left might even be the larger of the two.

The effect of all thefe cavities connected with the larynx is to increafe the refonance of the voice. The cartilaginous frame of the larynx and trachea in all animals has the fame operation in a greater or lefs degree; for if the cordæ vocales could only occafion the parts immediately adjoining them to vibrate, the found which they would produce would fcarcely be audible. The power of hollow parts in multiplying found, or rendering it loud by a fecondary vibration, is ftrikingly exemplified in the difference obferved between the *common* and the *mute fiddle*. The body of the latter is a narrow folid piece of wood, and although the tones are the fame as thofe of the common fiddle, they are fo faint as fcarcely to be heard. The influence of the laryngeal cavities upon the voice is clearly fhewn in thofe animals which poffefs them. The *howling baboons*, that have the beft contrived apparatus for increafing the voice, are faid to utter a cry which is really terrific.

One fpecies of *monkey*, the *fimia panifcus*, has a different kind of dilatation than is found in the reft of this tribe. It is a very confiderable enlargement of the membranous part of the trachea immediately behind the cricoid cartilage. The mufcles which go from the larynx to the pharynx comprefs this fac, and urge the air it contains in a ftronger current through the parts that immediately produce the voice.

Cuvier defcribes in this monkey, and in all thofe of the continent of America, a peculiarity in the ftructure of their larynx, by which their voice is rendered foft, like the tone of a flute, and they are therefore called *whiftling monkies*. This peculiarity confifts in the fmallnefs of the arytenoid cartilages, and the great bulk of the cuneiform cartilages, which, increafed by fome fat cellular fubftance, form before the fuperior extremity of the ventricle of the glottis a large cufhion, having the figure of a fegment of a fphere on each fide. It follows from this ftructure, that the air which has vibrated in the ventricles has to go through a narrow canal, curved in the figure of an S, which is formed by the oppofition of thefe cufhions and the concavity of the epiglottis.

In the *fimia jacchus*, and the *fimia midas*, the cuneiform cartilages are fo large, that their fuperior projection even divides the upper part of the glottis into two, fo as to give it apparently a refemblance to the larynx of birds.

The os hyoides is large and round on the front, even in thofe *monkies* which do not poffefs laryngeal facs, as in the *fimia apella* and the *fimia capucina*.

In the *lemur*, the fuperior ligaments of the glottis are very prominent, and there are between them and the epiglottis depreffions, which might be confidered perhaps as fuperior cordæ vocales and ventricles.

The epiglottis of the *bats* is foft and hardly perceptible. Its exiftence has been denied by Vic d'Azir. The cordæ vocales alfo are very indiftinct. In the *vampyre bat*, there is a flight membranous projection in place of epiglottis.

In the *dog* genus the cordæ vocales are prominent, thin, and free; the ventricles are deep; and the membrane which lines them is wider than they are. The cuneiform cartilages have the fhape of an italic *S*. The loofenefs of the cordæ vocales and the membrane of the ventricles, no doubt tends to produce the *barking* voice of thefe quadrupeds.

In the *cat* genus, the anterior ligaments of the glottis are, as in the *dog*, contiguous to the internal parietes of the epiglottis, but are feparated by a wide deep groove on each fide. The pofterior ligaments, or *cordæ vocales*, are not loofe or fharp. There are two fmall thin membranes near them, which, when they vibrate, produce the *purring* found of the *cat's* voice. Cuvier thinks, that the anterior ligaments of the epiglottis conftitute the cordæ vocales of the *cat*, the ventricles being fo very fhallow.

The *ichneumon* and *civet* have the organs of voice fimilar to thofe of the *cat* genus.

In the *badger*, the ventricle is open, and leads into two pouches, one of which extends forwards under the root of the tongue, where it is only feparated from that of the oppofite fide by the hyo-epiglottidei mufcles; the other goes backwards between the thyroid and cricoid cartilages. The found of the voice in this animal appears to be occafioned by the vibration of the breath againft the pofterior edge of the anterior ligament, when it is driven with force into thefe two pouches. There are fimilar pouches in the *weafel*, but the anterior has lefs extent.

The *marfupial* animals have the larynx peculiarly formed.

In the *kanguroo* the arytenoid cartilages are very large, Their fuperior edge forms the two-thirds of that of the glottis. The cuneiform cartilages, the anterior ligaments, and the ventricles of the glottis, do not exift in this animal, and it can fcarcely be faid that there is even any pofterior ligament or cordæ vocales. Cuvier is difpofed to think that the *kanguroo* is very nearly mute.

The *American opoffum* has alfo the arytenoid cartilages of great fize, and the thyroid cartilage concave. The fuperior ligament of the glottis is wanting, as in the *kanguroo*. The cordæ vocales are very fmall, and fcarcely to be diftinguifhed from the furrounding membrane. There is an oval epiglottis, with two little folds of membrane at its root, which are fufceptible of vibration.

The *long-tailed phalangers of Cook* have a membrane, which ferves at once for a vocal ligament and the edge of the glottis; between which, and the cricoid cartilage, there is a groove which might be confidered as a ventricle in an unufual fituation. This ventricle has alfo been obferved in the glottis of the *ornithorhynchus*, in which animal it is very deep. Both the *ornithorhynchus* and *echidna* have the edge of the glottis formed by the arytenoid cartilage, and a fingle vocal ligament. There is no ventricle in the glottis of the *echidna*.

In the *didelphis orientalis* there is no diftinct ligament, and the epiglottis is deeply notched.

In the *faltigrade* mammalia, Cuvier has defcribed two different kinds of ftructure in the organs of voice. In the one, of which he gives the *porcupine* as an inftance, the cordæ vocales and ventricles are not found, or fcarcely difcernible: in the other, which feems to belong to the great majority of the

the order, the vocal ligaments are diſtinct, and the ventricles often deep. The glottis in the *hare* and *rabbit* is peculiar. It wants the ſuperior ligament, and the cuneiform cartilages: nevertheleſs, the arytenoid cartilages are pyramidal, and afford attachment to two cordæ vocales, which are very free and thin edged, and are ſeparated from the baſe of the epiglottis by a deep narrow groove. Between their commiſſure, at the baſe of the epiglottis, there are two little cartilaginous tubercles projecting inwards. They do not give any attachment to the anterior extremities of the vocal ligaments, which are fixed externally to them.

Amongſt the *edentata*, Cuvier deſcribes the organs of voice as differing in each genus. In the *Cape ant-eater* (*oryctleropus*), the cordæ vocales form the edge of the glottis; there is but a ſlight groove in place of the ventricle. In the *armadillo* the larynx is ſmooth internally, and the epiglottis is in two lobes.

The *tardigrade* quadrupeds have a ſingularly formed larynx. The free edges of the cordæ vocales are the inferior ones; they hang down againſt the inner ſide of the cricoid cartilage, like triangular valves. There are no ventricles or anterior ligaments.

Amongſt the *many-hoofed tribe* of quadrupeds, the *elephant* has a ſimply formed larynx. The inferior ligaments of the glottis or cordæ vocales are prominent, and ſharp edged. They aſcend in proceeding to their anterior attachment much more than is uſual. The ventricles are mere grooves.

In the *pig*, the direction of the cordæ vocales is peculiar: they deſcend anteriorly. They are long and ſharp edged, and capable of being rendered extremely tenſe by the actions of the larynx, which enable this animal to utter the ſhrill cry it is ſo remarkable for. The ventricle opens poſteriorly into an oblong ſinus, that aſcends between the internal membrane and the thyroid cartilage. The magnitude of this ſinus has been over-rated by ſome anatomiſts. Its real ſize, according to Cuvier's obſervations and our own, is about ſufficient to admit the end of the little finger. It is this cavity which enables the *pig* to produce the *grunting* ſound, the cordæ vocales being at the ſame time in the relaxed ſtate.

In the *cloven-hoofed* quadrupeds, a ſuperior angle of the arytenoid cartilages bends backwards, and makes the two-thirds of the end of the glottis; and an inferior angle of the arytenoid bends forwards, and gives attachment to the cordæ vocales. This laſt has the anterior part more or leſs free, ſharp, and thin, according to the ſpecies, but its poſterior edge is blunt, and continued into the membrane lining the reſt of the glottis. The anterior ligaments are not found, and the place of the ventricle is ſupplied by the furrow ariſing from the projection of the cordæ vocales. There are no cuneiform cartilages in this tribe. The thyroid cartilage ſwells out anteriorly, where the cordæ vocales are attached in the *fallow deer*, and ſtill more in the *cervine antilope*, in which the projection is nearly pyramidal. The ſwelling under the throat in the *antilope gutturoſa*, is occaſioned by this enlargement of the thyroid cartilage.

There is a membranous ſac in the front of the thyroid cartilage in ſeveral of the *antilope* genus and the *rein deer*. The opening into it is at the root of the epiglottis. The ſac of the *rein deer* is very large, extending under the neck, as in the *mandril* (*ſimia maimon*.)

Cuvier has given a full deſcription of the organs of voice in the *ſolid-hoofed* quadrupeds, in which he has corrected many errors in the account of the larynx of the *horſe* and *aſs* by Heriſſant. The chief peculiarities of the vocal organs of theſe animals, conſiſt in the ſacs connected with the larynx. There are three of theſe: one is ſituated anteriorly, under the vault formed by the anterior boundary of the thyroid cartilage: the opening into it is under the root of the epiglottis. The two others are oblong ſinuſes contained between the lateral parietes of the glottis and the thyroid cartilage, and covered, in a great meaſure, by the thyro-arytenoidei muſcles, by which they are compreſſed. There is no anterior ligament of the glottis, nor any ventricle, properly ſpeaking; but above the cordæ vocales, on each ſide, there is a foramen which leads into the lateral ſac.

In the *horſe* the apertures of the lateral ſacs are long and wide, and bear ſome reſemblance to the uſual ventricles of the glottis. The opening into the anterior cavity is very wide in the *horſe*, in which alſo this cavity is a ſhallow depreſſion. On the contrary, in the *aſs*, the opening into each of the three ſacs is a ſmall and round hole, and the anterior ſac is a real bag of conſiderable ſize.

Cuvier ſtates that the *mule*, which is generated by the *male aſs* and the *mare*, has the openings into the laryngeal ſacs wide, and the ſtructure of the organs of voice altogether approaching that found in the *horſe*, and he concludes that the account publiſhed by Heriſſant was taken from the diſſection of the offspring of the *ſtallion* and the *female aſs*. Blumenbach has, however, followed many other anatomiſts in attributing ſimilar organs of voice to the *common mule* and the *aſs*. We are not enabled to decide the point, not having diſſected theſe organs in the *mule*.

Cuvier further adds, that in the *horſe* and the *mule* there is at the commiſſure of the two cordæ vocales a ſlight fold of the membrane, which is not viſible in the *aſs*. The ſize of this fold has been greatly exaggerated by Heriſſant; he has alſo attributed to it important offices which it does not ſeem to perform.

The peculiar ſound called a *bray*, is uttered by the *aſs* in conſequence of the extent of the laryngeal ſacs, and their being ſo much ſeparated from the cavity of the larynx, by thus having ſmall apertures. The *bray* ſeems to be a compound diſcordant ſound, produced from the reſonance of different ſized cavities.

Cuvier found in the *couagga* the larynx organized as in the *horſe*, except that the membrane extending from one corda vocalis to the other did not exiſt.

The larynx is very peculiarly formed in the *cetacea*. The arytenoid cartilages and the epiglottis have the figure of very elongated triangles. Theſe three cartilages are united to each other by the membrane of the glottis, and have a degree and kind of motion ſomewhat ſimilar to that of the parts about the mouth of a fiſh. The top of the larynx, which is compoſed of theſe three cartilages, has a pyramidal figure, and is inſerted into the common origin of the poſterior nares. It is retained in that ſituation by the circular muſcles of the fleſhy tube which forms the common paſſage to the nares. The uſual office of the epiglottis is, therefore, loſt in *cetacea*, and inſtead of making an operculum to the rima of the glottis, it enters into the compoſition of that aperture, which is thence rendered wideſt in the tranſverſe direction, and reſembles very much, in appearance, the mouth of a fiſh. The advantage of having the air-tube immediately connected with the naſal paſſages in the *whale* kind, muſt be obvious. Theſe animals catch their prey by ſwimming with their mouths open, and below the ſurface of the ſea, at which times, the water and ſmall fiſh are carried through the fauces on each ſide of the pyramid formed by the larynx. When, however, the latter is withdrawn from the poſterior nares, in order to eject the water through the ſpiracles, the rima glottidis is ſhut; but rather by the edges being cloſely applied to each other, than by being covered by the epiglottis.

The

The interior part of the larynx in *cetacea*, exhibits no true cordæ vocales or ventricles. The membrane, at the anterior part of the cavity, forms ſome very irregular folds, or rather a corded appearance, reſembling, in a degree, the internal ſurfaces of the heart. Cuvier ſays, he only perceived ſome longitudinal rugæ. The inequalities on the interior part of the larynx, in theſe animals, do not, however, appear capable of vibrating ſufficiently to produce any voice; or if the *whale tribe* do utter any ſound, it muſt, we conceive, be a kind of *hiſs*, occaſioned by the forcible emiſſion of the air through the aperture of the glottis.

In *Plates* XIV. and XV. of the *Anatomy of Mammalia*, the figures are found which illuſtrate the ſtructure of the organs of voice.

In *Plate* XIV. *fig.* 8 repreſents the entire larynx and ſac of the *mandril* (*ſimia maimon*), as it appears when diſſected out: *a*, the root of the tongue left with the larynx; *b*, the os hyoides; *c* is the laryngeal ſac diſtended with air; *d*, the trachea ſeen beyond it. *Fig.* 9, of the ſame plate, ſhews the larynx opened from behind; and the hole which leads into the laryngeal ſac, as it uſually appears in thoſe monkies that have theſe dilatations connected with the organ of voice: *a*, the epiglottis; *b*, the foramen at its baſe, opening into the laryngeal ſac, which has been cut off in this preparation; *c*, *c*, the cordæ vocales; *d*, *d*, the two ventricles.

In *Plate* XV. *fig.* 1 is a view of the larynx, and bony ſac attached to it, divided longitudinally to ſhew their internal formation in the *howling baboon*. This figure is copied from one of Vic d'Azir's, and of courſe agrees with his deſcription of the organs of voice in this animal: *a* is the tongue, divided lengthwiſe through its middle; *b*, *e*, pharynx and œſophagus laid open; *c*, the ligament between the bony ſac and the thyroid cartilage; *q*, *s*, *o*, *p*, *t*, larynx and trachea laid open; *d*, epiglottis; *f g h*, bony ſac laid open; *i k l*, the courſe of the tube leading from the ſac to the larynx; *m*, a projection of the thyroid cartilage dividing the tube into two; *p*, the corda vocalis of that ſide; *o*, the ventricle of the glottis. *Fig.* 2 exhibits a view of the larynx, ſimilar to the laſt, in the *ſimia paniſcus*: *a*, the tongue; *b*, the epiglottis; *c*, the thyroid cartilage; *d*, the arytenoid cartilage; *f*, the ventricle of the glottis; *g g*, cricoid cartilage; *h*, the ſac, which in this animal is placed at the membranous part of the beginning of the trachea: it is laid open. *Fig.* 3 repreſents the interior of the larynx in the *cat*: *a*, the epiglottis; *b*, *b*, the cordæ vocales; *c*, *c*, the two membranes, which are thought to produce, by their vibration, the *purring* ſound made by this animal. *Fig.* 4 ſhews the internal parts in the larynx of the *pig*: *a*, *a*, the ligaments of the glottis ſeen deſcending towards the thyroid cartilage; *b*, *b*, the ventricles; *c*, *c*, their opening into the ſinuſes connected with them. *Fig.* 5 is the larynx of the *porpoiſe* laid open behind: *a*, the epiglottis; *b*, *b*, the arytenoid cartilages; *c*, the wrinkled or corded appearance, which ſeems to correſpond with the cordæ vocales and ventricles of other mammalia. *Fig.* 6 gives a view of the interior of the larynx in the *horſe*, to ſhew the opening into the three laryngeal ſacs: *a*, the aperture of the anterior ſac; *b*, *b*, the openings of the lateral cavities; *c*, the tranſverſe membrane found in the *horſe* at the commiſſure of the cordæ vocales. *Fig.* 7 is a lateral view of the larynx and ſacs in the *aſs*, with the parts laid open: *a*, the anterior ſac, which has a conſiderable capacity, although ſo ſmall an opening into the larynx; *b*, the aperture of the lateral ſac on one ſide; *c*, part of the ſac of the other ſide, which is not removed in the diſſection.

MAMMARIA, in *Natural Hiſtory*, a genus of the claſs Vermes, and order Molluſca. The generic character is, body ſmooth; without cirri or rays; aperture ſingle. There are three

Species.

MAMMILLA. In this the body is conic, ventricoſe, white: it is found in the North ſeas.

VARIA. Body ovate, varied with white and purple: inhabits the northern ocean.

GLOBULUS. Body globular, cinereous, and not fixed. Found on the Greenland ſhores, among the roots of fuci. The body is very ſimple, ſoft, ſmooth, gelatinous, with a thin ſkin about the eighth of an inch in diameter.

MAMMARY, in *Anatomy*, an epithet applied to various parts belonging to, or connected with, the breaſt. The internal mammary artery is a branch of the ſubclavian ſituated within the cheſt. (See ARTERY.) There is a vein correſponding to it. The mammary gland is the organ ſecreting the milk. See BREAST.

MAMMEA, in *Botany*, one of Plumier's genera, ſo called from its vernacular appellation in the Weſt Indies, *Mamei*. Linnæus admitted the name, becauſe of its affinity to *mamma*, a breaſt, alluding to the ſhape of the fruit. Schreber and Jacquin place this genus in the claſs *Polygamia*, but we refer it, after Linnæus and Willdenow, to *Polyandria*. Plum. Nov. Gen. 44. t. 4. Linn. Gen. 265. Schreb. 729. Willd. Sp. Pl. v. 2. 1157. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. ed. 2. v. 3. 297. Jacq. Amer. 268. Juſſ. 257. Lamarck. Illuſtr. t. 458.—Claſs and order, *Polyandria Monogynia*. Nat. Ord. *Guttiferæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, cloven into two, roundiſh, concave, leathery, coloured, widely ſpreading, deciduous ſegments. *Cor.* Petals four, roundiſh, concave, widely ſpreading, ſomewhat leathery, longer than the calyx. *Stam.* Filaments numerous, briſtle-ſhaped, erect, very ſhort, inſerted into the receptacle; anthers oblong, obtuſe, erect. *Piſt.* Germen roundiſh, depreſſed; ſtyle cylindrical, erect, longer than the ſtamens, permanent; ſtigma capitate, convex. *Peric.* Fruit ſpherical, fleſhy, of one cell, very large, pointed with a part of the ſtyle, its rind leathery. *Seeds* four, nearly ovate, rough, ſeparated from each other by the pulp.

Eſſ. Ch. Corolla of four petals. Calyx of two leaves. Fruit very large, inferior, with four ſeeds.

Obſ. The flowers of this genus, inſtead of being always perfect, are occaſionally found to be only male ones on the ſame or on a different plant. This was obſerved by Jacquin, and Browne in his hiſtory of Jamaica takes occaſion from this circumſtance to make different ſpecies of ſuch as have perfect, and ſuch as have only male flowers; Swartz alſo obſerves that the former trees are larger and loftier than the latter.

1. M. *americana*. American Mammeé apple. Linn. Sp. Pl. 731. Plum. Ic. t. 170.—A native of Jamaica, Hiſpaniola, and the Caribbee Iſlands. A tall, handſome *tree*, with a thick ſpreading, elegant head. *Branches* quadrangular when young. *Leaves* oppoſite, on ſhort footſtalks, oval, or obovate, entire, blunt, very ſmooth and ſhining, leathery, firm, from five to eight inches in length. *Flower-ſtalks* ſhort, ſcattered over the ſtouter branches, bearing a ſolitary, fragrant, white *flower* an inch and half in diameter. The *calyx* is occaſionally trifid, and the *corolla* five or ſix-petalled. *Fruit* ſlightly angular, generally having one or two abortive ſeeds, from three to ſeven inches in diameter; its rind double, the outer leathery, tough, browniſh; the inner thin, yellow, adhering cloſely to the *pulp* which is firm, bright yellow, of a pleaſant, though ſingular flavour, and a ſweet aromatic ſmell. The *ſkin* and *ſeeds* are bitter

bitter and refinous. Jacquin tells us that the Mammee fruit is eaten raw and alone, or cut into flices with wine and fugar, or preferved in fyrup. In Martinico, the flowers are diftilled with fpirits, making a liquor which is called *Eau Creole*. The French term this plant *Abricot-fauvage*, the yellownefs of its pulp refembling that of an Apricot. Browne informs us that this is one of the largeft trees in Jamaica, that it abounds with a refinous gum, and is efteemed one of the beft timber-trees. From Miller we learn that it rifes to the height of fixty or feventy feet, and that its fruit, which is of a yellowifh-green colour, and highly efteemed, is commonly to be purchafed in the markets of the Spanifh Weft Indies.

This tree having a long downright tap-root, is of courfe very difficult to tranfplant, fo that the beft mode of propagating it is by fetting the ftones or feeds, as frefh as poffible, in pots filled with light earth, and then to plunge them into a hot-bed of bark.

M. *afiatica* of Linnæus Sp. Pl. 731, is now called Barringtonia; fee that article in this work, and in Mart. Mill. Dict. v. 1.

Willdenow defcribes another fpecies which he calls *humilis*, the fruit of which contains only three feeds; but he fays that Vahl takes it to be nothing elfe than *Rheedia lateriflora* of Linnæus.

Mammea, in *Gardening*, contains plants of the evergreen exotic tree kind, of which the fpecies moftly cultivated is, the American mammee, (M. americana.)

Method of Culture.—This tree may be increafed from feeds procured from America, which fhould be fown in the early fpring, in pots filled with light frefh mould, plunging them in a bark hot-bed, keeping the mould moift by occafional watering, when they will foon come up. The young plants fhould be often watered in dry weather. When they have attained fome growth, they fhould be removed, with earth about them, into other pots a little larger, being replaced in the hot-bed, till frefh rooted, filling up the pots with frefh mould; due fhade, air, and water being given. In the autumn they fhould be removed into the ftove, where they muft be kept, being fhifted into other pots in the following fpring; having regard not to over-pot them.

And they may alfo be raifed by placing the ftones of the fruit under the pots upon the tan, more expeditioufly than when planted in the mould of the pots.

Thefe plants afford a fine variety among others of the ftove kind.

MAMMEE Bay, in *Geography*, a bay on the north coaft of the ifland of Jamaica. N. lat. 18° 58′. W. long. 77°.

MAMMILLARIS Processus, in *Anatomy*, the fame as the maftoid procefs. This term, mammillary, has been fometimes applied to the uriniferous fubftance of the kidney. See Kidney.

MAMMOTH'S Teeth, or *Mammout Bones* and *Mammon's Horns*, in *Natural Hiftory*, names given by travellers and other writers to certain foffil teeth, and other bones, found in Ruffia and fome other parts of the world, and that ufually at great depth in the earth. The Ruffians and other people give them this name, fuppofing them to have belonged to an animal, which they defcribe as being of a monftrous fize, and living in caverns under ground. But the true account of them is, that they are in reality the teeth and other bones of an animal now unknown, there being no fuch beaft as thefe people defcribe. The mammoth of America, whofe enormous bones are found particularly near the falt fprings upon the Ohio, though armed with tufks of ivory, has been fuppofed to be even five or fix times larger than the elephant; but the bones are probably the fame with thofe of the fuppofed elephant found in Siberia. In Siberia the bones of the mammoth are thrown afhore from the Frozen ocean; and it is probable that thefe and other fimilar remains may have been driven by currents from very diftant parts of the globe, and depofited on the banks of rivers by the tide, when a great part of the north of Siberia was covered by the fea. The tufks of the mammoth are equal to elephants' teeth in whitenefs and beauty, but very different in their fhape, being all bent fpirally, forming about one round and a half; and eight feet form their greateft length. See Elephant's *Bones*, Ivory, &c.

MAMOOJOO, in *Geography*, a town on the weft coaft of the ifland of Celebes. S. lat. 2° 19′. E. long. 119° 12′.

MAMORA. See Mahmora.

MAMOS, a town of South America, in the audience of Quito; 110 miles E.N.E. of Archidona.

MAMOSA, La, a town of Naples, in Bafilicata; 19 miles S.W. of Turfi.

MAMOUTKAN, a town of Afiatic Turkey, in the province of Caramania; 12 miles S.E. of Erekli.

MAMPATA, in *Botany*, according to Juffieu, is the Senegal name of a tree, gathered there by Adanfon, which the former conceives to be of the fame genus with Aublet's *Parinari*, Aubl. Guian. t. 204—206, the *Petrocarya* of Schreber, though its nut is lefs deeply furrowed, and the ftamens appear to be fifteen inftead of fourteen. The germen, moreover, is laterally attached to the calyx. See Petrocarya and Neou.

MAMTRASNA, in *Geography*, a mountain of Ireland, in the county of Galway; 15 miles S. of Caftlebar.

MAMUD, an ifland in the Sooloo Archipelago. N. lat. 6° 4′. E. long. 121° 42′.

MAMUL, a town of Walachia; 31 miles N.E. of Krajova.

MAMUN, a town of Africa, in the country of Sugulmeffa; 25 miles S.E. of Sugulmeffa.

MAN. To write a complete hiftory of man, it is neceffary that we fhould defcribe both the individual and the fpecies: that we fhould, with reference to the former, relate the phenomena of his firft production, examine his anatomical ftructure, his bodily and intellectual functions, and his difeafes, and purfue his progrefs from the time of birth to the grave: in refpect to the latter, it would be neceffary to point out the circumftances that diftinguifh him from other animals, to delineate the phyfical and moral characters of the people inhabiting the different portions of the globe, and trace their progrefs from the firft rudiments of civil fociety to the ftate at which they are now arrived (See on the latter fubject, Condorcet Tableau du Progrés de l'Efprit humain; Ifelin, Gefchichte der menfchheit; Fergufon's Hiftory of Civil Society; Adelung verfuch einer Gefchichte der Cultur des menfchlichen Gefchlechts, &c.) To treat the fubject in this way would demand a familiar acquaintance with almoft the whole circle of human knowledge, and a combination of the moft oppofite purfuits and talents; of the knowledge of nature poffeffed by a Buffon, a Cuvier, or a Blumenbach; the infight into the operations of the human mind and paffions of a Hume, a Rouffeau, and a Condorcet; and a knowledge of hiftory and antiquities in their moft extenfive fenfe: a cyclopædia would be neceffary, rather than a fingle article. This extenfive labour, which could not be properly executed by any individual, is divided into feveral fubordinate branches. The anatomift and phyfiologift unfold the ftructure and functions of the body; the furgeon and phyfician defcribe its difeafes; and the metaphyfician and moralift employ themfelves with the functions that

that conftitute the mind, and with the moral fentiments. We refer, therefore, to the different articles of the Cyclopædia on thefe fubjects; giving only, what could not be entirely omitted in a view of the hiftory of man, a fhort general fketch of his paffage through the various periods of his exiftence. Man in fociety, his progrefs in the various countries and ages of the world, his multiplication, &c. &c. are the province of the hiftorian and political economift. Our object, in the following article, is the defcription of the fpecies. We fhall fpeak, in the firft place, of the fituations which man occupies on the globe, of his food, intoxicating drinks, dwellings, and drefs: we fhall endeavour to explain the diftinctions, more particularly in bodily ftructure, between man and animals; to defcribe the principal differences between the various races of mankind, and to confider the caufes by which thefe have been accounted for. This, indeed, is rather what our limits and the confined knowledge of an individual reftrain us to, than a difcuffion of all the points which the hiftory of man fhould involve. We think it fhould contain, moreover, a confideration of the original abode and diftribution of the fpecies, of the varieties of intellectual power, and moral difpofitions. The remarkable manners and cuftoms, the employments and pleafures, the notions of decency and elegance, honour and fhame, the religious opinions, forms of government and laws, particularly among uncivilized nations, are very interefting fubjects, when confidered in general, but are not included in the labours of the hiftorian or moralift. The education of children, and treatment of women, in all parts of the world; the various degrees of cultivation; the opinions of favage people concerning the moft important works and phenomena of nature; the origin of the moft neceffary fciences, as arithmetic, meafure of time, and medicine, are not lefs interefting than important topics, which are not confidered at all, as the hiftorian, the geographer, the moralift, and the man of fcience, occupied with other purfuits, confider them, each, as not belonging to his department. Thefe, together with the fubjects of the prefent article, would conftitute a peculiar fcience, or branch of fcience, under the name of the hiftory of man, which, in point of inftruction or entertainment, would not be inferior to the narratives of intrigue and treachery, of war, conqueft, and defolation, that compofe general hiftory.

The natural hiftory of man is yet in its infancy; infomuch, that we cannot pretend to give any thing like a complete view of the fubject. The defcription and arrangement of the various productions of the globe have occupied numerous obfervers in all ages of the world. Every plant and every infect has had its hiftorian, and has been defcribed with minute accuracy, while the human fubject has been comparatively neglected. In a very voluminous work on the hiftory of the animal kingdom, now publifhing in this country, ("General Zoology, or Syftematic Natural Hiftory,") man is entirely omitted. Does the learned author deem him more or lefs than an animal? Whether we invefligate the phyfical or the moral nature of man, we recognife, at every ftep, the limited extent of our knowledge, and are obliged to confefs that ignorance, which a Rouffeau and a Buffon have not been afhamed to avow. "The moft ufeful and the leaft fuccefsfully cultivated of all human knowledge, is that of man; and the infcription on the temple of Delphi contained a more important and difficult precept, than all the books of the moralifts." (Difcours fur l'Inegalité; preface.) The immortal hiftorian of nature gives his teftimony to the fame effect. "Quelque interet que nous ayons a nous connoitre nousmêmes, je ne fais fi nous ne connaiffons pas mieux tout ce qui n'eft pas nous." (De la Nature de l'Homme.) It is only of late, and principally through the excellent writings of Blumenbach, that the natural hiftory of man has begun to receive its due fhare of attention; and we fhall venture to affert, that, whether we regard the intrinfic importance of the queftions that arife, and their relation to the affinities, migrations, and hiftory of nations, or advert merely to the pleafure of the refearch, no fubject will be found more worthy of minute inveftigation.

I. *Hiftory of the Individual.*

The fources from which the hiftory of man muft be derived, are human and comparative anatomy; the natural hiftory of organifed beings in general, and of the animal kingdom in particular. Thefe branches of knowledge are of the greateft importance: comparative anatomy, and the analogies afforded by the natural hiftory of animals, will often afford us more afiiftance than the moft learned labours of the hiftorian. We muft not be content with noting the more ftriking varieties of the human fpecies, but muft inveftigate all the intermediate gradations. The beft fources of information in books, particularly of travels, muft not be employed too indifcriminately: a difpofition to doubt, and a critical eftimation and balancing of authorities, are effentially neceffary to prevent us from being led into error by the ignorance or credulity, the inaccuracy or the pre-conceived notions of the writers. Certain parts of phyfical fcience are connected with the fubject; as an acquaintance with the face of the globe, climates, &c. Hiftory, in the common acceptation of the word; that of the human race in its early periods; of particular people and their changes of fituation, when they have emerged from the thick cloud that covers the firft ages of the world, fo as to admit of being diftinctly traced, will very confiderably aid our inveftigations. The fubject ftill labours under difficulties, from our imperfect knowledge of the habits and anatomy of thofe fimiæ which moft nearly refemble man; from the impenetrable darknefs that involves the infancy of the fpecies; the uncertainty of the ancient geography in general, and of the modern geography of many remote regions; and our defective acquaintance with the wild races.

Progrefs of Man through the various Stages of his Exiftence.—The differences in ftructure and functions between the male and female are explained in the article GENERATION, under the head of *fexual diftinctions;* the mode in which reproduction is effected in the human fubject, as well as the different theories concerning this highly interefting and important, but obfcure function, are confidered in the fame article. Under EMBRYO, we have defcribed the formation and developement of the new being, and the circumftances in which its organization and mode of exiftence differ from thofe of the individual after birth.

Fetal Exiftence.—The precife period at which the future man begins to exift, and the form under which his rudiment appears, are not yet known. For many days after conception, the cavity of the uterus contains nothing in which we can conceive organization to refide: the lord of the creation is loft in a drop of mucus. A foft fubftance, not refifting the flighteft touch, and unfolding to our obfervation no arrangement of different parts, affumes a roundifh fhape about the fecond week after a fruitful coition, and may be regarded as the firft appearance of the ovum: a fœtus cannot be feen in this till towards the end of the third week. Poffeffing at this time the moft fimple kind of vitality, very fimilar indeed to that of the vegetable, it has true blood about the fourth week. Now the motion of the heart is vifible; in fome very rare inftances (Blumenbach, Inftit. Phyfiol.

Phyfiol. § 641.) it has been feen in the human embryo, but it was obferved even by Ariftotle in the incubated chick: its motion could not fail to be noticed from the contraft it afforded to the quiefcence of the other parts, and hence the expreffion of *punctum faliens*. The formation of bone commences at the feventh or eighth week: bony nuclei are firft vifible in the clavicles, ribs, vertebræ, the larger cylindrical bones of the extremities, the lower jaw, and fome other bones of the face: a moft delicate bony network is developed at the fame time in the flat bones of the cranium, as the frontal and occipital, later in the parietal, &c.

The nearer the embryo, and indeed the animal both before and after birth, is to the epocha of its firft production, the more rapid is its growth. That the firft germ, when hidden in the ovum, muft be exceedingly fmall, is clear, becaufe it efcapes our clofeft obfervation, even when affifted by the microfcope: from this minutenefs it increafes in nine months to the weight of fix or eight pounds. It grows in the firft month to 300,000 times its firft fize; in the fecond month to 48 times; and in each of the remaining months of utero-geftation, one with the other, to 15 times. At the end of three years the child has grown from 105 to 281 ounces, or nearly in the ratio of five to fourteen; and in the 22 following, from 281 to 2250 ounces, which is an increafe of about eight times.

About the middle of pregnancy, motions of the child are firft perceived by the mother; in common language it is faid to *quicken*, and the popular notion is that it receives life at this time. The judicial queftions concerning abortion, and the execution of pregnant criminals, render it important that right views fhould be entertained on this point. By the Roman law the punifhment of death was inflicted, when a formed and animated fœtus perifhed by abortion intentionally produced; and it was held that the fœtus poffeffed animation on the fortieth day. In this country a condemned criminal is refpited, if fhe is found to be *quick* with child. It feems to be implied in both cafes, and fuch we believe to be the general opinion, that the child is not alive until a certain period of geftation. This is moft erroneous, phyfiologically: vital proceffes, as an exceedingly rapid growth and developement of parts, are carried on with great activity from the earlieft time, at which the germ can be difcerned, and the heart actually beats at the fourth week. Hence, if abortion be procured at the end of a month, or a woman be executed at the fame time, a child is deftroyed in either cafe, juft as much as if thefe things happen after the ordinary period of quickening. Our phyfiological views of fetal exiftence lead us to fuppofe that the creature in utero has no fenfations, and is unconfcious of its own life: its deftruction, therefore, cannot be charged with the infliction of cruelty on a fentient being.

Divines are much interefted in a point allied to this; namely, at what time the new being has a foul. Very nice queftions have been raifed in the Romifh church concerning the propriety of baptifing, adminiftering the facrament of extreme unction, and performing the burial fervice at particular ages; and thefe muft be equally interefting topics to all, as fuch ceremonies are ordained for the benefit of thofe animals only which have fouls. Phyfiologifts, in general, have not acted very fairly in refufing their affiftance towards elucidating fo important a fubject. "De his myfteriis," fays Haller, "et de animæ humanæ origine, perinde cum Galeno abftineo pronuntiare." He adds, however, immediately after, that he fuppofes the fœtus to have a foul, when it performs fpontaneous motion. (Lib. 29, fect. 3, § 21.) To afcertain the meaning of the word foul, is a very important preliminary in fettling our notions on this fubject. We are fully convinced that the fœtus has no fenfations, and confequently can have no will, nor any intellectual functions (fee EMBRYO): this is equivalent to faying that it has no foul. For an account of the different opinions concerning the nature and faculties of the foul, fee SOUL.

Fat and bile are formed about the middle of utero-geftation. In the remaining part of the time, the hair of the head and the nails appear; the external ear becomes firm and elaftic; and the teftes defcend in the male.

The fœtus is lodged in the uterus, until its organization is arrived at fuch a degree of developement, as will enable it to affume independent exiftence. During its refidence in this organ, it may be regarded as a part of the body of the mother: although it has brain, organs of fenfe and voice, thefe are yet inactive, and do not give rife to any relations between it and furrounding objects: its organs of digeftion, fecretion, and locomotion, are equally inert, and calculated, like the former, for the fucceeding ftage of exiftence. It has all the organs that enable it to exift by itfelf, although their functions are not neceffary while it continues in the womb of the mother. (See MONSTER.) The chief peculiarities of the fetal ftate are, the fimplicity of its life, confifting of little more than the function of nutrition, and the inactivity of almoft all the important organs: its confinement, furrounded by the fluid of the amnios, in the uterus, where no external impreffions can reach it, and the exercife of the moving powers is impracticable, even if volition could take place: the connection with the mother through the umbilical chord and placenta (fee EMBRYO): the uniform colour of the blood in all the veffels, and the communications between the two fides of the heart. (See HEART and CIRCULATION.) As refpiration has never taken place, the lungs fink in water. (See LUNGS.) The cæcum is very different from that of the adult, and the large inteftine, in general, is diftended with a peculiar dark green femi-fluid fubftance, called meconium. (See INTESTINE.) The urachus, the membrana pupillaris, and the defcent of the teftes, are important peculiarities in the fetal ftate, as nothing like a rational conjecture concerning their ufe or purpofe can be formed. (See the defcription of the bladder, in the article KIDNEY; of the iris, in EYE; and of the teftis, in GENERATION.) Three organs, of a tiffue approaching more nearly to that of glands than to any other, appear by their fuperior fize in the unborn child to belong particularly to its economy, although here, as in the parts juft noticed, we are entirely ignorant of the ufes to which they are fubfervient. The two former are not only much larger in the fœtus than in the adult, but they alfo contain a confiderable quantity of fluid in their texture; the thymus, although as large as the heart in the fœtus, is entirely loft in the adult: the two other organs are much fmaller comparatively after birth. See THYMUS, LARYNX, and KIDNEY.

Birth.—Towards the end of the tenth lunar month, when the child has arrived at a weight varying from four to eleven pounds, though generally between five and eight, and is from eighteen to twenty-one inches long, parturition takes place; feveral very important changes occur in the animal economy, and a ftate of being, altogether new, commences. "Nothing," fays Buffon, "exhibits fuch a ftriking picture of weaknefs, of pain, and of mifery, as the condition of an infant immediately after birth. Incapable of employing its organs or its fenfes, the infant requires every kind of affiftance; it is more helplefs than the young of any other animal; its uncertain life feems every moment to vibrate on the borders of death. It can neither move nor

 fupport

ſupport its body; it has hardly ſtrength enough to exiſt, and to announce, by groans, the pain which it ſuffers; as if nature intended to appriſe the little innocent, that it is born to miſery, and that it is to be ranked among human creatures only to partake of their infirmities and afflictions." Hiſtory of Man, ſect. ii.

The navel-ſtring being tied and divided, the connection between the mother and child is ſeparated. In animals, this cord is ſevered by the teeth; if it were not tied in the human ſubject, fatal hæmorrhage would enſue. The child, from the warm medium of the amniotic fluid, is introduced into a new and more ſtimulating element, the air, and draws it into his lungs: thus reſpiration begins, and produces changes in the blood, which ſeem to make up for the loſs of the placental circulation. A healthy and ſtrong child generally cries as ſoon as it comes out of the vagina, and inſpiration is neceſſary to this action. We uſually waſh the body with warm water and ſoap, in order to remove the greaſy ſubſtance that covers the ſkin, and are very careful to keep the child warm; but there are whole nations, inhabiting climates colder than our's, where the infants are plunged into cold water as ſoon as they are born, without receiving the ſlighteſt injury. The deſire for food ſeems to be coeval with the commencement of the new exiſtence: ſucking is performed at once in a perfect manner, as ſoon as the mouth is brought to the nipple.

Within a few hours after birth, meconium and urine are diſcharged. The infant ſleeps much, and ſeems to awake only for the purpoſe of taking food: the gratification of the latter want, and ſleep, are the great employments of the firſt months.

Infancy.—As we remember nothing of what paſſes at this early period of our exiſtence, we cannot diſcover the feelings produced by the firſt impreſſions of the air; but the cries uttered immediately after birth ſeem to indicate that the action of the atmoſphere cauſes painful impreſſions. The ſenſes at firſt act very imperfectly; the newly born creatures have a ſtupid appearance, and give hardly any proof that their organs of ſenſe act. The eyes are fixed and dull, and have not the motions which accompany diſtinct viſion; yet they feel the impreſſion of light, and the pupil contracts or dilates in proportion to its quantity. When any thing is ſuddenly brought near to the eye, neither the lids nor the head are moved. The other ſenſes are in an equally imperfect ſtate. All the other parts of the body are extremely feeble, and their motions awkward and ill directed. The thighs and legs are bent, from the habit contracted while in the womb of the mother; there is not ſtrength enough to ſeize any thing with the hands; if abandoned in this condition, the child would remain on its back, without being able to turn to one ſide or the other. See LIFE.

The pulſation of the brain is felt at the fontanells.

Beſides the commencement of the functions that connect us to the external world, as well as thoſe of the digeſtive apparatus, and the modifications of the circulating organs conſequent on the ligature of the chord, and the beginning of reſpiration, various alterations in the external habit of the body are diſcernible after parturition. The downy covering of the ſkin gradually diſappears, the wrinkles are obliterated, the nates are developed, and hide the opening of the anus.

A newly born infant diſcovers pain by its cries; but it has no expreſſion indicating pleaſure. It ſmiles about the ſixth or ſeventh week, and it begins to weep about the ſame time; for its former cries were not accompanied with tears.

Newly born children ſleep much, but only for ſhort periods; they require very frequent nouriſhment, and expreſs this want by crying, which generally terminates their ſleep. This indication ſhould always be carefully attended to. Nothing is required in addition to what nature has provided in the mother's milk; no ſubſtitute is equal to this, though the milk of other animals may be employed in caſes of neceſſity: the teat of the animal may be ſubſtituted for that of the mother. Buffon ſays that he has known ſeveral peaſants, who had no other nurſes than ewes; and yet they were equally vigorous as thoſe who had been nurſed by their mothers.

As ſoon as the infant had eſcaped from the uterus, and enjoyed the liberty of ſtretching its limbs, it was again condemned, while the uſe of ſwaddling clothes prevailed, to a more cruel and unnatural bondage. The head and limbs were fixed, and the whole body ſo laced and fettered, that hardly a joint could be moved. People now begin to find out that the developement of the body will be accompliſhed without this artificial aſſiſtance. Perhaps they are hardly yet aware, that the efforts of the little priſoners to diſentangle themſelves have a more direct tendency to diſtort their members, than any poſitions they could aſſume, if left in the full poſſeſſion of liberty. Swaddling bands may be compared to the ſtays worn by young girls, which occaſion many more deformities and diſeaſes than they are intended to prevent. The practices of ſavage nations have been much more rational than thoſe of the civilized; they lay their infants naked in hanging beds of cotton, or cradles lined with fur, in which they are at perfect liberty to move themſelves as they are inclined, and provide at the ſame time very carefully for abſorbing the moiſture of their diſcharges. No improvement can be ſuggeſted on this plan.

As the child becomes accuſtomed to external objects, it gradually learns the uſe of its ſenſes, and loſes the apparent ſtupidity that characterizes it for the firſt months of exiſtence. It is fond of light, and directs its eyes always to the lighteſt part of a room; hence the propriety of placing it ſo that both eyes may receive the light at the ſame time, and conſequently acquire by exerciſe an equal degree of ſtrength. It is attracted by any ſhining objects, and endeavours to ſeize them; when pleaſed, it ſmiles; and cries and attempts to reſiſt, when it is hurt or vexed: it recogniſes individuals, and is frightened by ſtrangers. The organs of the external ſenſes are more perfectly finiſhed, as the external ear, the noſtrils, the ſuperciliary arches and eye-brows, &c. At the ſame time, the mental functions, dependent on the operation of theſe organs, as attention, perception, memory, the will, &c. are gradually developed: hence dreams are obſerved in a few months after birth. The bones of the cranium become more firmly united, and the fontanells are gradually cloſed. Dentition, which begins about the ſixth or ſeventh month, is a moſt important era in the life of the infant. The proceſs is always painful, and not unfrequently fatal. For the deſcription of the teeth and the hiſtory of their developement, ſee CRANIUM: the dangers with which it is accompanied are deſcribed under INFANTS, *Diſeaſes of.* This change points out the natural time for weaning: the newly acquired inſtruments, which injure the nipple of the mother, enable the infant to uſe firmer food, and thus make it independent of the breaſt. As conception does not uſually take place again, while ſuckling is continued, mothers, who wiſh not to have a numerous family, often keep the child at the breaſt long after this time, although there is no advantage to be derived to the child from the practice.

Oſſification goes on with great activity, and confers on all parts of the ſkeleton that firmneſs which is eſſential to the execution of their functions. Bony nuclei are ſeen in the cartilages, which are afterwards to form the bones of the carpus

carpus and tarfus. The urine contains little or no phofphat of lime, as that fubftance is all employed in the completion of the bones. Towards the beginning or middle of the fecond year, they have become ftrong enough to fupport the weight of the body, hence the infant at this time begins to learn the ufe of his feet, and to affume the erect attitude, one of the moft remarkable prerogatives of the human fpecies. The fmallnefs of the lower limbs and pelvis, in comparifon to the head and upper part of the trunk; the foft ftate of the bones, as well as the want of power in the mufcles, which, like the organs of fenfe, require the flow education of frequent exercife; and the very complicated exertion neceffary to maintain the body erect (fee MUSCLE, towards the end), poftpone the power of going alone to this late period after birth, and render all the motions and pofitions connected with it very unfteady and unfafe for a ftill longer time; although animals in general can maintain themfelves in their natural attitudes tolerably well from the day of birth. Attempts to make the child affume the erect attitude before the epocha we have mentioned, are dangerous, as the flexible bones, unequal to the burden, give way under it, and thus deformity is produced.

Removal from the mother's breaft, and the power of going alone, are two very important fteps, and the progrefs towards independent exiftence is greatly affifted by another remarkable privilege of the human fpecies, the ufe of fpeech, which begins in children of lively minds foon after the firft year. The founds uttered in the careffes of the mother are attended to, and eagerly imitated; and every faculty is ftrained to the utmoft, for the purpofe of acquiring the ufe of an inftrument fo important towards attaining the gratification of its daily increafing defires, and eftablifhing its communications with furrounding beings. The power of fpeech, however, like the ufe of the fenfes, and of the moving organs, is not poffeffed perfectly at once; it is the offspring of laborious and repeated efforts. The vowel A (broad) is the moft eafily pronounced, as it requires only the opening of the mouth, and forcing out the air: the confonants, B, P, and M require the leaft motion of the organs, and are moft eafily articulated. The other founds are formed in proportion as the organs learn their offices. (See ARTICULATION.) Some can articulate diftinctly, and repeat whatever is faid to them, at two years of age, but a longer time is generally neceffary.

While the infant is thus flowly advancing in the developement of its powers, it is expofed to numerous and deftructive difeafes, which render its life very precarious for the three firft years. (See INFANTS, *Difeafes of.*) Half of the children produced die in the firft few years of life, and the work of deftruction proceeds ftill more rapidly, when they are crowded together in confiderable numbers. Camper informs us, that of 5989 admitted into the eftablifhments for foundlings at Paris, in one year, 4095 died in the firft month, and 673 more in the remaining eleven months: only 884 were alive at the end of five years. Ludwig Grundrifs der Naturgefchichte der Menfchenfpecies, p. 293. See MORTALITY.

About the feventh year, the deciduous or milk teeth begin to fall out, and a fecond dentition enfues. Of the thirty-two permanent teeth, which are defigned to remain through life, the greateft number have come into the vacancies left by the fucceffive difcharge of the temporary ones, by the twelfth year; but the whole fet is not complete till the 18th or 20th year.

Childhood, or Adolefcence.—In the age of infancy, memory feems to excel the other faculties of the mind, and affords a moft commodious inftrument for retaining the figns of furrounding objects. It hardly continues in its original ftrength beyond the fifteenth year. The imagination is developed after it, and begins to predominate when the memory is weakened; its exercife is affifted by the happy memory of this age, which fupplies it with materials. The judgment is developed at a later age: children pafs rapidly from one object to another, without beftowing the time for accurate comparifon and enquiry, which judgment requires.

The nervous fyftem is eafily affected in childhood, and grief and joy are excited by flight caufes. Much time is paffed in fleep.

A confiderable ftratum of fat covers the body under the integuments, hides the mufcles and bones, and beftows a roundnefs and foftnefs of outline on the whole frame. See MEMBRANE, *Cellular*, and MUSCLE, under the head of *developement* of thofe tiffues.

The fluids undergo a confiderable change: in the fœtus, or in a young child, the urine, fæces, and perfpiration are not fetid; the bile is not bitter; all the fecretions indeed are mild. But the urine foon acquires its diftinguifhing fmell; the kidnies, which form an agreeable food in the calf, are rejected on account of their ftrong tafte in the bullock; the fæces become more confiftent, and have a powerful odour. The food and mode of life are not the caufes of thefe alterations; for the fæces, perfpiration, &c. have their ftrong fenfible properties in the adult, even when the diet confifts of milk or vegetables.

Puberty.—The great developement of the imagination is about the age of puberty, when man is prepared, by various and important changes of his organization, for the exercife of the generative functions. Nature hitherto feems to have had nothing further in view than the growth and prefervation of her work. The child enjoys an exiftence confined to itfelf, which it cannot communicate; but the principles of life foon multiply beyond what is fufficient for our own being, and enable us to beftow exiftence on others.

When the mammæ enlarge in the female, the beard fhews itfelf in the male, and the other phenomena of approaching puberty are exhibited in both fexes, as the developement of hair on the external organs, &c. the former begins to have the menftrual difcharge, which is accompanied, amongft other appearances, with increafed luftre of the eyes, rednefs of the lips, and more fenfible properties in the perfpiration; the latter fecretes true femen, having at the fame time a more copious growth of the beard, and a memorable change of the voice into a deeper tone. The latter, for a confiderable time, is rough and unequal; after which it becomes more full, articulate, and ftrong. This change is very confpicuous in boys; but it is lefs diftinguifhable in girls, whofe voices are naturally more fharp. A very remarkable enlargement of the vocal organ, coeval with puberty, is the fource of the alteration juft mentioned. There is hardly a fenfible difference of fize in the larynx, between a child of three, and another of twelve years: there is at leaft nothing correfponding to the diverfity of ftature. But at puberty, in the fpace of a year, the opening of the male glottis is doubled, both in length and breadth. This increafe in the female is only in the proportion of feven to five. (Richerand, Elem. de Phyfiol. ed. 3. § 226.) Thefe marks are not always uniform. The beard, for example, does not always appear precifely at the age of puberty: there are even whole nations, who have hardly any beard. On the contrary, there is no country where the age of puberty in women is not diftinguifhed by the enlargement of the breafts. At the fame time the fexual inftinct is awakened by what we may call the fpontaneous internal voice of nature, and both fexes, in this fpring of their exiftence, become capable of exercifing that important function of all animated beings, the propagation of the fpecies. For the detailed confideration of this fubject, fee GENERATION. In that article the reader will find a view of the changes occurring in the generative organs at this age, and of the effects, which they exert in the body in general, of menftruation, and of the phenomena obferved where unufual organizations exift, conftituting what have been often called hermaphrodites.

Virginity, impotence, circumcifion, caftration, infibulation, &c. are articles fo important in the hiftory of man, either on account of the intereft attached to fome of the fubjects, or of the general prevalence of fome of the practices, that we fhould confider it a facrifice of what is effential to falfe notions of delicacy, if we paffed them over entirely unnoticed. On the fubject of virginity, fee the account of the hymen, in the defcription of the vagina, in the article GENERATION, and Buffon's Hiftory of Man, fect. 3: refpecting *Circumcifion* and *Impotence*, fee thofe articles; and concerning the latter, Mr. Hunter's Treatife on the Venereal Difeafe, pt. iii. ch. 11 and 12. Boys are infibulated by drawing the prepuce forwards, piercing it, and putting through the holes a fmall cord, which remains until the cicatrix is formed; the cord is then removed, and a ring fubftituted in its place, which is made of fufficient ftrength to laft as long as the perfon, who ordered the operation, pleafes; and it fometimes remains for life. The Eaftern monks, who took the vow of chaftity, ufed to employ a large ring, which rendered a breach of their oath impoffible. On this fubject hardly any thing can be imagined fo ridiculous that it has not been practifed by fome men, either from motives of paffion or of fuperftition. A fimilar mode of fecuring the chaftity of the women, which could only be fuggefted by the rudenefs of their manners, has been practifed in many barbarous nations. In Ethiopia, and other parts of Africa, in Arabia, Pegu, and other nations of Afia, the inhabitants, immediately after the birth of females, few up thofe parts which nature has feparated, leaving only a fpace fufficient for the natural evacuations. As the child grows, the parts gradually adhere, and when the time of marriage arrives, they are again difunited by incifion. Inftead of thread, the fibres of the afbeftos are faid to be employed, which is a fubftance not liable to fudden corruption. Some tribes content themfelves with putting a ring through the parts. To this precaution wives as well as girls are fubjected, with this difference, that the ring allotted to the latter cannot be removed, but in that of the former there is a lock, of which the hufband keeps the key.

The practice of caftration is of great antiquity, and has prevailed very extenfively. It is employed in Afia, to procure guards for the chaftity of the women; in Italy, this infamous, this cruel operation, has for its object only the improvement of the voice. Befides deftroying the faculty of propagation, it prevents, or very fignally modifies, the changes that ufually occur at the time of puberty, and remarkably influences the voice. (See GENERATION and EUNUCHS.) The fpecies of caftration varies according to the object in view; the tefticles only are removed, when the improvement of the voice is intended. But men, whofe minds are poffeffed with jealoufy, would not believe their females fafe in the cuftody of fuch eunuchs; they employ none but thofe who have been deprived of all the external organs of generation. Sometimes the texture of the organs has been deftroyed by preffing and rubbing them for a long time; but the effect of this procefs cannot be fo fecurely depended on as that of removal. Infancy is always preferable for thefe operations. The amputation of the tefticles is not very dangerous: but the more complete removal is often fatal, efpecially if performed after the age of fifteen; even in the moft favourable time, from feven to ten years, there is always great danger. The difficulty of preferving fuch eunuchs renders them exceedingly precious. Tavernier informs us, that in Turkey and Perfia, they bring five or fix times the price of the other kind. Chardin obferves, that the total amputation is performed pretty fafely upon young children, and is exceedingly dangerous after the age of fifteen; that hardly a fourth part efcape with life, and that the wound is never cured in lefs than fix weeks. On the other hand, Pietro della Valle afferts, that thofe who fuffer this punifhment in Perfia for rapes, and other crimes of that nature, recover eafily, though advanced in years; and that they apply nothing but afhes to the wound. According to Thevenot, vaft numbers of negroes, who are forced by the Turks to fubmit to this operation, perifh, even when it is performed on individuals eight or ten years old.

The arrival of puberty differs according to climate, temperament, way of life, &c. fo that no particular age can be fet down for its general occurrence. It is earlier in women than in men; the former, in our climate, fhew the phenomena of puberty at about the age of fifteen, the latter at that of eighteen. Inftances are not very uncommon, of confiderable developement of the body, with the changes that ufually occur at puberty, fuch as the appearance of the beard, enlargement of the generative organs, fecretion of femen, expanfion of the breafts, flow of the menfes, and formation of hair on the pubes, at a much earlier age than we have mentioned. Befides the inftances related in the article GENERATION, a confiderable number may be found in Haller's Elementa Phyfiologiæ, lib. xxx. fect. i. § 15. Puer triennis pubefcens, virili in pudendis robore, altus 37 uncias. Journ. de Medecine, 1757. Puella quatuor annorum mammis confpicua et pube, ut etiam menfes pateretur. Valifneri Op. t. iii. p. 309. Puer quatuor annorum nubilis, feminarum cupidus, voce gravi, tanto robore, ut libras 50 elevaret. Journ. de Medecine, 1759. Many other examples are mentioned of children younger than thefe, who exhibited figns of puberty, fuch as the growth of the beard, and of the hair on the pubes; and there are numerous inftances of others from four years upwards, who have been able to perform all the fexual functions. The termination of the growth of the body in length is fixed a little after this time; the epiphyfes of the bones, hitherto diftinct from the bodies, now coalefce, and are completely confolidated to them.

Stature of Man.—There is no fixed law, determining invariably the human ftature, although there is a ftandard, as in other fpecies of animals, from which the deviations, independently of difeafe or accident, are not very confiderable in either direction. In the temperate climates of Europe, the height of the human race may be ftated at five feet two inches to five feet ten. Schreber gives to the human fpecies a height of from two feet four inches, to five feet eight inches. (Mammalia, t. i. p. 27.) Individuals of fix feet, and even as high as fix feet three and four, are not uncommon in this and other European countries. Occafional inftances have been known in various parts of the world, of men reaching the height of feven and eight feet; and ancient as well as modern authors fpeak of the human ftature reaching nine, ten, and even eighteen feet. The latter reprefentations are generally grounded on bones dug out of the earth; thefe, together with the common propenfity to believe and report what is marvellous, and the notion that mankind have undergone

undergone a degeneracy fince their firft formation, have led to a very common belief that the human ftature in general, is at this period lefs than it was in remote ages. We are warranted in fufpecting the accounts of fuch great elevation above the ordinary ftature, in the human fpecies, by obferving that nature, within the time of which we have any authentic records, exhibits no fuch difproportions in other fpecies. We find, too, that the height of thefe giants is reduced, as we approach to modern times, to what we have opportunities of obferving now; fo that we may probably affirm, that no fufficiently authenticated example can be adduced of a man higher than eight or nine feet. The large bones on which the notions about giants have been, in many inftances, founded, have been difcovered, by the accurate examinations of modern fcience, to belong to extinct fpecies of animals of the elephant and other allied kinds. Of the loofe and unphilofophical mode in which thefe matters have generally been inquired into, we have a fpecimen in the fuppofed bones of a barbarian king. Habicot, an anatomift, in a work entitled "Gigantofteologie," defcribes fome huge bones, found near the ruins of the caftle of Chaumont in Dauphiny, in a fepulchre, over which was a grey ftone, infcribed TEUTOBOCCHUS REX. This fkeleton, he fays, was 25½ feet long, and 10 broad at the fhoulders. Riolan, in his "Gigantomachie," difputes the meafurements, and affirms that the bones belong to the elephant. In the long controverfy which enfued, it is remarkable that no exact defcription or reprefentations of the bones fhould have been given. It is very furprifing that fuch a philofopher as Buffon fhould have figured and defcribed the foffil bones of large animals as remains of human giants, in the 5th vol. of the fupplement of his claffical work. Among others he has thofe dug up at Lucerne, in the 16th century, and ftill preferved there. Blumenbach found thefe, on the firft view, to be elephants' bones. Felix Plater, an excellent phyfician and anatomift of his time, after carefully examining and meafuring thefe bones, declared that they belonged to a human giant of feventeen feet, and had a drawing made of this fkeleton, according to his opinion of its dimenfions, which is ftill preferved in the Jefuits' college at Lucerne. (Blumenbach de Gen. Human. Variet. Nat. p. 251, note.) That men in general were taller in the early ages of the world than at prefent, or that examples of very tall men were then more frequent than now, has been afferted without any proof. The remains of human bones, and particularly the teeth, which are unchanged in the moft ancient urns and burial places, the mummies, and the farcophagus of the great pyramid of Egypt (Norden's Travels), demonftrate this point clearly; and every fact which we can collect from ancient works of art, from armour, as helmets and breaft plates, or from buildings defigned for the accommodation of men, concurs in ftrengthening the proof. Blumenbach has the fkull and bones of an old perfon, taken out of a burial place of the moft remote antiquity in Denmark (in antiquiffimo tumulo Cimbrico), and correfponding in fize to the modern ftandard. (Ibid, p. 252, note.) That we cannot have degenerated in confequence of the habits of civilized fociety is clear, becaufe the individuals of nations living in a way fo different from us as the Americans, Africans, Southern iflanders, &c. do not exceed us in ftature. Indeed it has been generally obferved that the Americans are fhorter than the Europeans.

We frequently meet with examples of individuals below, as well as above the ordinary ftature; but when the deviation is confiderable, they are rarely well made.

Giants and Dwarfs.—In mentioning individuals who have exceeded the ordinary height, it is neceffary to confine ourfelves, in order to avoid what may be fabulous or exaggerated, to inftances in our own times. One of the king of Pruffia's gigantic guards, a Swede, was 8½ feet, and a yeoman of the duke John Frederic, at Brunfwick-Hanover, was of the fame meafure. Gilly, who was fhewn, meafured 8 feet (Swedifh). I. H. Hartmann Reichardt of Friedberg, near Frankfort, was 8ft. 3in.: his father was a giant, and his fifter a giantefs. A female of Stargard, named La Pierre, was 7 ft. (Danifh). Ludwig, Grundrifs der Naturgefchichte, &c. p. 150. See alfo Haller, Elem. Phyfiol. lib. xxx. fect. 1. § 17. Martin Salmeron, the Mexican giant, is the fon of a Meftizo by an Indian woman, and meafures 7 ft. 3½ in. (Englifh.) He is very well proportioned. Humboldt's Political Effay, b. ii. ch. 6. Several Irifhmen, of from 7 to 8 feet, have been exhibited in this country. Bebe, the dwarf of Staniflaus king of Poland, was 33 in. (French), and well proportioned. His fpine became curved as he approached manhood; he grew weak, and died at 23. Buffon, Hift. Naturelle, xv. p. 176.

The Polifh nobleman Borwlafki meafured 28 Paris inches; was well made, clever, and fkilled in languages. He had a brother of 34 in. and a fifter of 21. Memoirs of the celebrated dwarf Jof. Borwlafki, &c. Lond. 1788.

A Friefland peafant at 26 years of age had reached 29 Amfterdam inches. C. H. Stöberin of Nürnberg was nearly 3 feet high at 20, well proportioned, and poffeffed of talents. Her parents, brothers, and fifters, were dwarfs. Lavater Phyfiognomifche Fragmente iv. p. 72.

Of numerous other inftances on record, moft feem to have been difeafed, and particularly rickety, individuals; fo that they may rather be claffed among pathological phenomena. The men who have confiderably exceeded the ordinary ftandard, have neither poffeffed thofe proportions in their form, which we account elegant; nor has their ftrength by any means correfponded to their fize. The head, in thefe cafes, is below the ratio which it fhould bear to the body, according to what we deduce from men of ordinary ftature; hence the brain muft be comparatively fmaller. It is a general obfervation that very large men are feldom diftinguifhed by extent or force of mental power. The dwarfs, again, are generally ill made; the head, in particular, is too large. There are very few inftances of what we could deem healthy well made men, with all the proper attributes of the race, much below the general ftandard.

Manhood.—The age of manhood extends from the twenty-firft or fifth year to the forty-fifth or fiftieth in the male; it begins and ends rather fooner in the female. At its beginning the growth of the body in length has ended; but it ftill increafes in the other dimenfions. All the organs acquire a fuperior firmnefs in their texture; the fat and cellular fubftances are diminifhed, and the mufcles confpicuoufly enlarged; hence the fharp and hard lines of mufcular protuberances are fubftituted in the place of the rounded and foft outlines of youth. Great mufcular ftrength, vigour, and celerity in the actions of the nervous fyftem, perfect execution of all the bodily functions, in fhort the higheft ftate of vitality, are the attributes of this age. It is not lefs characterized by a perfect developement of the mental faculties. The judgment in particular is matured, and fucceeds to the empire of imagination. Man is now capable of fulfilling all the duties of active life as a citizen and parent. During this long interval, he enjoys the plenitude of his exiftence. It has been fuppofed that the body remains in the fame condition in this part of life, and hence it has been called by Latin writers, *ftatus hominis*. The function of nutrition fupplies whatever is loft in the other proceffes of the economy, and thus a perpetual change is kept up, although the body appears the fame; in this circulation, it has been conceived that

that the whole is changed in the courfe of a few years. There are no accurate data for calculating the time in which all the particles are renewed; probably, however, this is different in the different tiffues. The hair and nails are rapidly renewed; the fat is often increafed or removed within a very fhort time; on the contrary, the marks in the fkin produced by punćturing it, and rubbing in various coloured fubftances, continue through life.

Towards the latter half of the age of manhood, there is a difpofition to the depofition of fat over the whole body; indeed fuch depofitions take place at any part of this period, when tranquillity of mind and inactivity of body are joined with copious food. Fat is particularly formed about the abdomen. (See Corpulence.) As the growth of the frame is finifhed, and all the functions are carried on with vigour, there is a redundance of nutrient particles, by which we can account for this occurrence.

Temperaments.—We avail ourfelves of this age, in which the characters of the human fpecies, roughly fketched in infancy and youth, are fixed and drawn in indelible colours, in order to delineate the diftinctive traits of individuals. We defignate by the word temperament the phyfical and moral differences of men, depending on the various proportions and relations of the part entering into their organization, as well as on the various degrees of energy in certain organs. Thus, the collection of circumftances in the organization or functions of the body, that characterife a number of individuals, conftitutes their temperament. Again, each perfon has a mode of being peculiar to himfelf, diftinguifhing his temperament from that of all others, to fome of whom he may, however, bear in general a confiderable refemblance. Thefe individual temperaments, of which the knowledge is highly important in the practice of medicine, are called idiofyncrafies.

The predominance of a particular fyftem of organs modifies the whole economy, impreffes ftriking differences on the refults of organization, and exerts no lefs influence on the moral and intellectual than on the phyfical powers. This predominance eftablifhes temperament, of which it is the caufe and effence.

Since the conftruction of the body follows the fame model in all, it feems ftrange, at firft fight, that each individual fhould be different from all others, and fhould poffefs a character peculiar to himfelf. Let the number of tiffues, or elementary ingredients of the body, be confidered; let the number of organs compofed by thefe be taken into the view; let us remember the various vital properties which thefe poffefs, and the very numerous functions which they exercife. The original component ftructure may differ, the organs, which they build up, may vary: the vital forces exift in every poffible degree from the higheft pitch to the loweft ftate: the functions are modified by innumerable caufes, as climate, food, clothing, way of life, exercife, labour of mind and body, &c. &c. By the various combinations produced by all thefe differences, individual temperaments or idiofyncrafies are fufficiently accounted for. It feems probable, however, that thefe diverfities are in a great meafure factitious: all wild animals are alike; the differences between individuals are not confiderable in the domefticated races: and there is much greater general refemblance between individual men in favage than in civilized life.

When we afcribe temperaments to differences of organization, we are aware that the truth of the propofition cannot be eafily proved, that the anatomift cannot trace in the material fabric the caufes of thefe phenomena, which at prefent muft be regarded rather as characters of the vital functions than of the organization. The operation of moral caufes, too, muft greatly obfcure this intricate queftion. Education, acquired habits, fituation, and fortune in life, and a long lift of caufes, have fo great an influence on the character and many of the bodily functions, that we are at a great lofs in pointing out what ought to be afcribed to original conformation or difpofition, and what flows from fubfequent agency. We wifh, therefore, the following fketch of temperaments which we have borrowed from a French writer (Richerand, Elemens de Phyfiologie, chap. 11.) not to be received in a very rigorous fenfe, as founded on the bafis of anatomy, but rather to be regarded as a ftatement of the views generally entertained on the fubject, to the truth of which, anatomically, we would not be confidered as pledged.

When the agents of circulation, the heart and bloodveffels, enjoy a predominant activity, the pulfe will be ftrong, frequent, and regular, the fkin highly coloured, the phyfiognomy animated, the forms foft but well expreffed, the flefh tolerably firm, the embonpoint moderate, the hair light coloured; the nervous fufceptibility lively and rapid, united with quick conception, good memory, and fportive imagination. Such individuals facrifice freely to Bacchus and Venus, and have their health rarely interrupted by difeafe. The latter is generally fituated in the circulating fyftem, (inflammatory fever, inflammations, active hæmorrhages,) and requires the ufe of antiphlogiftic remedies, particularly of blood-letting. The ancients gave the name of *fanguine* temperament to this difpofition of body: they had very correctly obferved that it was to be noticed generally in young perfons of both fexes, and that its characters are moft clearly developed in fpring.

The phyfical traits of this temperament may be feen in the beautiful ftatues of Antinous, and the Apollo of Belvedere: its moral phyfiognomy is delineated in the lives of Marc Antony and Alcibiades. Inconftancy is a characteriftic attribute of this temperament; great variety is neceffary as well as agreeable to the individuals whom it marks. Generous, fenfible, and paffionate, but inconftant, they are too foon tired after poffeffion, and free themfelves from the dominion of Beauty at the very inftant when fhe fancies fhe has fecured them by a durable chain. He, on whom nature has beftowed a fanguine temperament, vainly endeavours to renounce fenfual enjoyments, and arrive, by deep meditation, at abftract truth: overpowered by his phyfical difpofitions, he is conftantly forced back to the pleafures which he avoids: his mind is better calculated for the brilliant productions of wit, than the fublime conceptions of genius.

When a man of this temperament is forced, by his condition, to undergo labours, which exercife confiderably his organs of motion, the mufcles acquire a developement proportioned to that of the circulating organs, and increafe in fize; the mufcular or athletic temperament, characterifed by all the external figns of vigour, is the refult. The head is fmall, the neck powerful, particularly behind, the fhoulders broad, the cheft wide, the hips firm, and the mufcular forms ftrongly marked. The hands, the feet, the knees, and all the joints not much covered by mufcles, appear fmall; the tendons difplay themfelves under the fkin. The fufceptibility is not confiderable, but when the calm is once difturbed, the greateft refiftances are overcome. The Farnefe Hercules affords a model of the phyfical attributes of this conftitution, and the exploits of this demi-god, as recorded in fabulous antiquity, give us a tolerably juft notion of the concomitant moral difpofitions. We fee him performing his twelve labours without calculation, without reflection, and, as it were by inftinct, courageous becaufe he is ftrong, feeking obftacles that he may overcome them, certain of overwhelming

overwhelming all refiftance, but uniting with this vaft ftrength fo little addrefs, that he is cheated by all the kings whom he ferves, and by all the women whom he loves. It would be difficult to find inftances of men who have joined to the phyfical force of this temperament a confiderable degree of intellectual power. To attain excellence in the fciences or fine arts, acute fenfibility is neceffary, a condition almoft incompatible with any marked developement of the mufcles.

If to an eafily excited fenfibility we join the power of purfuing one object for a long time; if the pulfe is ftrong, hard, and frequent, the fubcutaneous veins prominent, the fkin of a brownifh tint, inclining towards yellow, the hair black, the flefh firm with the mufcles ftrongly expreffed; the paffions will be violent, the movements of the foul fudden and impetuous, the character firm and inflexible. Bold in conception, firm and invincible in execution, fuch men at different epochas have directed the deftinies of the world: courageous and active, they have fignalized themfelves by great exploits, and have commanded the dread or admiration, at all events the homage, of an univerfe. Such have been Alexander, Julius Cæfar, Brutus, Mahomet, Charles XII, Cromwell, cardinal Richelieu: fuch is Napoleon the Firft.

As love in the fanguine, ambition may be regarded the ruling paffion of the bilious. Obferve that man, who born in an obfcure family, vegetates for a long time in the lower ranks of life: great commotions agitate and overturn empires; he is at firft a fubordinate agent, but, concealing his defigns in his own breaft, he gradually rifes to the fovereign power, and employs, in retaining it, the fame addrefs which has aided his elevation. Such is the hiftory of Cromwell, and of all the extraordinary men, whofe talents have met with a favourable field for their developement. Profound diffimulation and invincible conftancy are equally neceffary for executing fuch defigns; and thefe qualities are eminently difplayed by men of the bilious temperament, as we may fee in the lives of pope Sixtus V. and cardinal Richelieu.

Premature developement of the moral faculties is another character of this temperament. When their youth had hardly ended, the men whom we have named conceived and executed defigns fufficient to render them illuftrious. The ancients called this the *bilious* temperament, as a remarkable developement of the liver, and fuper-abundance of its fecretions are united in it to energy of the fanguiferous fyftem. Derangements of the hepatic organs appear in the perfons of this temperament as a principal or acceffory circumftance of their difeafes.

When to the bilious temperament are added a difeafe of fome organ in the abdomen, a derangement in the functions of the nervous fyftem, or a feeble and irregular execution of the vital functions, the fkin affumes a deeper colour, the countenance is dark and reftlefs, the abdominal vifcera inactive, and the pulfe hard. The general uneafinefs gives a character to the thoughts; the imagination becomes melancholy, and the character fufpicious. The exceedingly numerous varieties of this temperament, which the ancients called *atrabilious* or *melancholic*, and the diverfity of circumftances which may produce it, fuch as hereditary difeafe, long continued anxiety, excefs of ftudy, &c. lead us to the opinion that the melancholic temperament is lefs to be regarded as a natural and primitive conftitution, than as a morbid affection, either hereditary or acquired. The characters of Louis XI. and Tiberius exhibit moft faithfully its moral traits, of which diftruft and timidity are the moft ftriking. The hiftory of men, who have attained celebrity in the fciences, arts, and literature, makes us acquainted with melancholic individuals of a different character: endued with an exquifite fenfibility, enthufiaftically fond of the beautiful, and capable of realizing it in their conceptions, living in fociety in a ftate of referve bordering on diftruft, analyfing moft carefully the actions of men, perceiving in matters of fentiment even the moft delicate fhades, but difpofed to unfavourable interpretations, and feeing all objects through the diftorting medium of melancholy. It would be extremely difficult to defcribe this temperament in a general or abftract manner. Although the ground of the picture is the fame, the finifhing is fufceptible of infinite variations: it is better therefore to refort to the hiftory of the illuftrious characters in whom it is exhibited. Of thefe, Taffo, Pafcal, Rouffeau, Gilbert, and Zimmermann, furnifh remarkable illuftrations. In the philofopher of Geneva particularly, the melancholic temperament exifted in a high degree of energy: numerous paffages of his well-known writings, and efpecially the two laft parts of the Confeffions and the Reveries du Promeneur folitaire, give us an inftructive picture of its workings.

When the liquids are abundant, they diftend and develope the cellular tiffue, and give to the whole body a confiderable volume. The flefh is foft, the countenance dull, the hair of fome light tint, the pulfe feeble, the forms rounded and inexpreffive, all the vital actions more or lefs languid, the memory treacherous, and the power of attention weak. The individuals of this temperament, called, by the ancients, pituitous, and which we term *phlegmatic*, have, generally, a ftrong difpofition to idlenefs, and an invincible repugnance to exercife of the mind as well as of the body: hence, we are not to be furprifed that no examples occur among the illuftrious men of Plutarch: little fuited for bufinefs, they have not exercifed dominion over their fpecies, nor altered the furface of the globe by negociation or conqueft. Atticus, the friend of Cicero, who lived on good terms with all the parties who fucceffively haraffed the Roman republic in the civil wars of Cæfar and Pompey, is an example of this temperament. The circulation is tranquil, the imagination cool, and the paffions moderate. From this moderation of the defires arife often the virtues of temperament, as they are called; virtues, by the bye, of which the poffeffors ought to be the lefs proud.

The property, by virtue of which we are more or lefs fenfible to impreffions on our organs, which is weak in the phlegmatic, very inconfiderable in the mufcular, moderate in the fanguine temperament, and tolerably lively in the bilious, conftitutes, when it is exceffive, the *nervous* temperament. This is feldom original, but more commonly acquired, and arifing from a fedentary life, habits of pleafure, and an unnatural ftate of mind, kept up by reading works of imagination, &c. Soft and fmall mufcles, and confequently inconfiderable fize of body, lively fenfations, promptitude and variability of decifion, are marks of this temperament: it is often exhibited in vapourifh women, in whom, however, it frequently exifts with tolerable embonpoint, the predominance of the nervous fyftem being connected with a moderate developement of the lymphatic fyftem. Convulfions are not unfrequent in fuch individuals. Antifpafmodics fucceed beft in the treatment of their difeafes, which always borrow their hue, more or lefs, from the temperament. This, like the melancholic, is not fo much a natural conftitution of the body, as the firft ftage of a difeafe. It exifts only, as the nervous affections, to which it difpofes, in focieties arrived at a high pitch of civilization, when man is as remote as poffible from the ftate of nature. The Roman women were not fubject to nervous

diforders

diſorders until the commencement of thoſe depraved manners, which ſignalized the downfal of the empire. Vapours were extremely common in France during the 18th century, in the times that preceded the ruin of the monarchy, and numerous works appeared on the ſubject within a ſhort time. Tronchin of Geneva acquired very extenſive reputation and a large fortune by his ſkill in treating theſe diſorders: he made idle women exerciſe themſelves habitually, till they were fatigued, and reſtricted them to ſimple and wholeſome food.

We cannot doubt, that the peculiar bodily diſpoſitions, on which the differences of temperament are grounded, are coeval with our birth; but they appear to be modified, or even entirely changed by education, mode of life, climate, and contracted habits. The prevalence of particular temperaments in certain countries ſhews us the influence of climate. The bilious characterizes the inhabitants of ſouthern climates; the ſanguine thoſe of the north; the phlegmatic conſtitution prevails in cold and wet countries, as Holland, &c. We rarely meet with individuals, who preſent the characters aſſigned to the various temperaments in all their purity, conſequently the ſketches here given of them are abſtractions, which it is difficult to realize. The ſanguine conſtitution is directly oppoſite to the melancholic, and never unites with it: we may make the ſame obſervation of the bilious and phlegmatic: yet a perſon, who is ſanguine in his youth, may become melancholic at a ſubſequent period of life; for man never remains as he came from the hand of nature: modified by every thing that ſurrounds him, his phyſical properties, as well as his character, preſent numerous differences at the different periods of his life.

Proportions.—The proportions which the parts of the body bear to each other, when its growth is completed, muſt alſo be conſidered in this diviſion of our ſubject. We have very little exact knowledge concerning theſe; they are hardly the ſame in any two individuals. Repeated obſervations alone can aſcertain a ſtandard, by which we may be enabled to form a perfect idea of the natural and beſt proportions of the human figure. The ancients made ſtatues ſo exquiſitely beautiful, that they have uniformly been regarded as exact repreſentations of the moſt perfect human forms. Theſe, which were only copies, are now conſidered as originals, becauſe they were not imitated from an individual, but from the whole ſpecies, ſo attentively compared, and diligently obſerved, that it is impoſſible to find an equal degree of ſymmetry and proportion in any one man that ever exiſted. We ſhall, therefore, relate the dimenſions of the different parts which theſe artiſts have fixed as ſtandards of perfection. The height of the body is ten times the length of the face; and each face, or tenth of the body, is divided into three equal parts; the firſt commences at the ſpringing of the hair on the forehead, and terminates at the root of the noſe; the noſe is the ſecond diviſion; and the third extends from the noſe to the end of the chin. The term noſe, or length of a noſe, is uſed to denote the third of a face, or the thirtieth part of the body. The firſt face begins at the root of the hair, above the forehead, and extends to the end of the chin; but, from the top of the forehead to the crown, there is ſtill a third of a face or a noſe in height. Thus, from the top of the head to the end of the chin, there is a face and a third; from the chin to the juncture of the clavicles, two-thirds of a face; and, therefore, from the top of the head to the breaſt is twice the length of the face, or the fifth of the body. From the joining of the clavicles to the under part of the breaſts, they reckon one face; from this to the navel is a fourth face; and the fifth extends from the navel to the diviſion of the inferior extremities, which ſhould complete half the length of the body. Two faces are exhauſted between the thigh and knee, to the laſt of which they allow half a face, being the firſt half of the eighth face; two faces are aſſigned between the knee and the top of the foot, and from that to the ſole half a face, which completes the ten faces, or the length of the body. This diviſion has been eſtabliſhed from men of ordinary ſize; but in thoſe of higher ſtature, they allow half a face additional between the breaſts and the commencement of the thighs, which, in tall men, is not the middle of the body.

When the arms are fully extended in a horizontal line, the ſpace between the tops of the middle fingers is equal to the length of the body. The ſpace between the two great toes, when the feet are ſeparated as widely as poſſible, is the ſame length. From the pubes to the heel is one-half of this length.

From the joining of the collar bones, to the articulation of the ſhoulder bone with that of the arm, is one face. When the arm hangs down, or is bent forwards, it is four faces in length; two between the ſhoulder and elbow, and two between the elbow and the root of the little finger; five faces, therefore, from the joining of the collar bones, and the ſame number for the other arm, make up the length of the body; about half a face remains for the length of the fingers; but it muſt be remarked, that this is loſt in the elbows and ſhoulders, when the arms are extended. The hand is about a face in length, the thumb a third of a face, or a noſe, and the longeſt toe is of the ſame length with the thumb. The under part of the foot is equal in length to the ſixth part of the length of the body; of this the tarſus compoſes three, the metatarſus five, and the toes four.

It is very difficult to fix the proportional thickneſs of the different parts of the body. The changes are ſo great when the ſame man is thin or fat, and the action of the muſcles, in different poſitions, creates ſo much variety in the dimenſions of the parts, that it is almoſt impoſſible to ſet down any fixed rules on the ſubject. The circumference of the trunk, about the cheſt or abdomen, equals half the length of the body.

Strength of the Body.—It is difficult to form any ſatisfactory compariſon between the ſtrength of men and of animals. The habit of exertion, the kind and quantity of food, the ſtate of health, and many other cauſes, have ſuch effect on the vital powers of the muſcles, that it is hardly poſſible to perform experiments under circumſtances in all reſpects ſimilar. Deſaguliers tells us, that by means of a certain harneſs, by which every part of a man's body was proportionally loaded, the perſon employed in the experiment could ſupport, in the erect poſture, a weight not leſs than 2000 pounds. A horſe, which is about ſix times the ſize of an ordinary man, ought, therefore, when managed in the ſame manner, to bear 12 or 14,000 pounds, a much greater weight than that animal can ſupport, even when it is diſtributed with every poſſible advantage.

The ſtrength of animals may likewiſe be eſtimated by agility, and perſeverance in labour. Men, when accuſtomed to running, are able to outſtrip horſes in the long run: a man will accompliſh a long journey ſooner, and be leſs fatigued, than the beſt road horſes. The royal meſſengers of Iſpahan, who are trained to running, go thirty-ſix leagues in fourteen or fifteen hours; we are aſſured by travellers, that the Hottentots outrun lions in the chace; and that thoſe ſavages, who live by hunting, purſue and even catch deer, and other animals of equal ſwiftneſs. Many

other

other ſtories are told of the amazing nimbleneſs of ſavages, of the long journies they accompliſh on foot over the moſt craggy mountains, where there is no path to direct, but every obſtacle to obſtruct their progreſs. Theſe people are ſaid to travel 1000 leagues in ſix weeks, or at moſt in two months. If we except birds, whoſe muſcles are proportionally ſtronger than thoſe of any other animals, no creature could ſupport ſuch long continued fatigue. Civilized man is ignorant of his own ſtrength; nor is he ſenſible how much he is weakened by effeminacy, nor to what extent he might recover his native force by an habitual and vigorous exerciſe of his powers.

Age of Decline.—Every object in nature muſt change and decay; the bodies of men, when arrived at full maturity, begin to decline. The waſte is at firſt inſenſible, and ſeveral years frequently revolve before we perceive any conſiderable alteration. The depoſition of fat may perhaps be regarded as the firſt ſtep towards decay; it is an addition of ſuperfluous matter, loading the body with an uſeleſs weight. As the quantity of it augments, the body loſes its former lightneſs and freedom of motion, the members become unwieldy, and extenſion is acquired at the expence of ſtrength and activity. But the moſt unequivocal ſigns of approaching old age are the ceſſation of the catamenia in women, often attended with a developement of the beard, diminiſhed ſexual appetite in men, the approach in both of what has been called the dryneſs of old age, (ſiccitas ſenilis,) and a ſenſible diminution of the vital forces. The epocha of theſe changes is from forty to forty-five in women; from forty-five to fifty in men: peculiar cauſes may either accelerate or retard the period. The individuals of both ſexes are now no longer capable of exerciſing that moſt important function, the propagation of the ſpecies; their ſexual life is at an end. Diminiſhed activity of the ſenſes and brain, impaired vigour in the moving organs, and leſſened energy of all the internal functions, gradually come on after this great revolution in the animal economy. Conſiderable organic changes are gradually developed; the motion of decompoſition begins to predominate in the internal functions, and the volume of the whole body is reduced. The cellular ſubſtance, ſoft and flexible in the youth, is converted into long and hard threads; it undergoes, over the whole body, a change that cannot but impair the mobility of the organs. The yielding ſkin of the infant, which has the ſoftneſs of velvet in the young woman, grows rough and harſh; a tawny and diſagreeable hue takes place of its freſh redneſs; its contractility is deſtroyed, the abſorption of the fat leaves it unſupported, and hence wrinkles are produced. They are firſt ſeen in the eye-lids, and extend over the whole body; but we notice them more particularly in the face, on the wrinkled front of which approaching decrepitude is marked in moſt legible characters. So hard does the texture of the ſkin become in very old individuals, that conſiderable force muſt ſometimes be uſed to penetrate it with a knife. The hair partakes of the ſame changes with the ſkin; it turns grey, becomes much thinner, then aſſumes a white colour, and is at laſt entirely loſt.

The cornea of the eye is rendered flatter, ſo that its power of refracting the rays of light, that come from near objects, is diminiſhed. The viſion of diſtant objects, however, is ſtill perfect; and the uſe of convex glaſſes ſupplies the imperfection in the ſight of what is near. A white circle is often developed in the cornea, near its attachment to the ſclerotica, and has been called arcus ſenilis.

The arteries are not exempt from the general decay; the larger trunks are dilated, their coats are more or leſs converted into a ſubſtance of cartilaginous or bony hardneſs, and aſſume a brittle texture. The proceſs of oſſification in the ſmaller tubes reduces their calibre. The capillaries are greatly diminiſhed in number. Hence injections, particularly minute ones, ſucceed very imperfectly in old bodies. This change affects organs of every deſcription; the ſame parts which exhibited innumerable blood-veſſels in the growing body, poſſeſs now but few and ſcattered ramifications. The veins are enlarged and varicous.

The muſcles become tough, and are rendered unfit in animals for the purpoſes of the table; fat is depoſited among their fibres, and the tendinous parts increaſe in their proportion. They feel, however, at this time actually ſoft and flabby.

The bones receive an undue depoſition of earthy matter, loſe their coheſion, break very eaſily, and unite after fractures very ſlowly and imperfectly. The cartilages become brittle, and in many inſtances are oſſified, the ligaments are rendered harder, but are leſs capable of reſiſting extenſion. The teeth fall out.

Analogous changes take place in all parts of the body, but are not equally obvious in all. Yet all the organs have ſomething peculiar in their characters at this time, by which we can eaſily diſtinguiſh them from thoſe of young individuals.

But the moſt important alterations are thoſe which affect the vital properties, and conſequently, the functions of the body. Theſe changes are often ſeen when the above-mentioned alterations of ſtructure are not viſible to any very great degree. The external ſenſes decay; viſion becomes dim, and hearing dull; the operations of the intellect are affected in the ſame manner, attention and perception are weakened, the memory becomes confuſed. Thus, the relations of the old man to the external world are gradually deſtroyed; he ſinks into ſecond infancy, becomes incapable of judging and willing, and has his intellectual world confined to a few confuſed recollections, which ſoon diſappear. When he is thus ſhut out from new impreſſions, he ſleeps moſt of his time, awakening only for the purpoſe of taking food; thus he is reduced to a kind of vegetative exiſtence.

The organs of motion loſe their vitality in an equal degree with thoſe of ſenſation and volition. The movements are ſlow, tremulous, and uncertain. The erector muſcles of the trunk can no longer ſupport it in the upright poſture, hence the body is bent forwards, and the legs become unable to ſuſtain and move the body. The intervertebral fibro-cartilages are compreſſed and reduced in ſize, and the ſtature, conſequently, experiences a real diminution.

Digeſtion, and the other parts of the aſſimilating proceſs, are executed ſlowly and imperfectly: the loſs of the teeth is diſadvantageous to the former. Food is taken at longer intervals; the bowels become torpid; and the fæces and urine are longer retained.

The vigour of the circulation is impaired; the pulſe becomes ſlower; the extremities of the body are ſoon rendered cold, and their vitality is ſo weak, that they eaſily ſlough. For a ſtatement of the number of the pulſe at different ages, ſee the article CIRCULATION.

Decrepitude.—From the end of manhood to death, there is a gradual progreſs, in which no ſtages can be very diſtinctly marked. Yet the firſt years of decay are ſometimes included under the term of green old age; in which all the functions are ſtill performed, but with leſſened energy. This may reach, with conſiderable latitude, however, to the ſixtieth year. In this time the memory grows dull: former events are remembered, but the more recent ſoon eſcape. This is ſucceeded by decrepitude. The nervous ſyſtem is now rendered nearly uſeleſs: the old impreſſions are effaced, and no new ones received. No deſire remains but that of food,

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which is the laſt to leave us: in the end food is not taken, unleſs it is offered. The irritation of the fæces in the large inteſtine is not perceived before death; and ſleep is almoſt conſtant. A. de Moivre, who died at the age of eighty-eight, ſlept twenty hours in the twenty-four during the laſt year of his life. Complete deafneſs and blindneſs come on. The muſcles are firſt exceedingly weak, and then loſe their power entirely, ſo that old people are obliged to lie conſtantly in bed. Exceſſive emaciation takes place. The heart at laſt fails; its pulſations are reduced to fifty, forty, thirty; and become intermittent; and the heat of the frame is no longer kept up.

Death.—For a more particular account of the changes preceding death, and of death itſelf, we refer to that article. We have only to add here a few obſervations concerning the apprehenſions generally entertained of this event. We have ſhewn, in the preceding ſketch, that life both commences and terminates by imperceptible degrees. Why then ſhould we be afraid of death, if we have no reaſonable apprehenſions of its conſequences? why dread this ſingle moment, which has been preceded by ſo many others of the ſame order? ſince death is fully as natural as life, and both arrive in the ſame manner, without our being able to perceive their approach. If we inquire of thoſe who are accuſtomed to obſerve the actions and ſentiments of the dying, we ſhall find that, except in a few acute diſeaſes, attended with agitations and convulſions, which exhibit only the appearances of pain, moſt men expire quietly, and without the ſmalleſt indication of uneaſineſs. Even when perſons ſeem to be afflicted with the moſt dreadful agonies, theſe have no exiſtence but in the imagination of the ſpectator: the truth of this has been repeatedly atteſted by many perſons who have recovered after the moſt violent commotions and convulſions, yet were unable to recollect any thing they had felt during this ſeemingly diſtreſsful ſituation. The greateſt part of mankind die, therefore, without being ſenſible of the fatal ſtroke; and of thoſe who preſerve their ſenſes to the laſt groan, there are very few who do not entertain ſome hope of recovery. Death is a ſpectre which terrifies us at a diſtance, but diſappears when we approach it more cloſely. That the ſucceſſion of ideas may be ſo rapid as to give to a moment the appearance of an age, and thus to ſubject our departure from exiſtence to excruciating torture, has been ſuppoſed without a ſingle proof in its favour, and againſt all probability and analogy. Exceſſive pain extinguiſhes all reflection; yet ſymptoms of the latter have ſometimes appeared in the very moment of violent death. When Charles XII. received the blow, which terminated, in an inſtant, both his enterpriſes and his exiſtence, he clapped his hand upon his ſword. This mortal pang, ſince it excluded not reflection, could not be exceſſive. He found himſelf attacked, and determined to defend himſelf; it is evident, therefore, that he felt no greater pain than he would have ſuffered from an ordinary ſtroke.

If it were as eaſy to diſſipate the terrors cauſed by the anticipation of what is to happen after death, and to quiet the minds of men concerning the undiſcovered country beyond the grave, the Tartarus, with its judges and furies, its lakes of liquid fire, and the other helliſh apparatus, as it is to prove that the termination of exiſtence is not phyſically painful, the human race would be moſt ſignally benefited, and would no longer have to envy brutes their peaceful death.

Rigidity of the body, joined with coldneſs, flaccidity of the cornea, open ſtate of the anus, lividity of the back, and a cadaverous odour, where they exiſt together, prove very ſatisfactorily that death has taken place.

It is hardly poſſible to ſet down any age as the natural period of life, as the moſt common and regular limit of advanced old age. Blumenbach obſerves, however, that a careful inſpection of ſeveral bills of mortality has ſhewn him, that a comparatively conſiderable number of Europeans reach their eighty-fourth year, while very few ſurvive it.

On the whole, although the human race is deſtroyed in ſuch numbers, among other cauſes, from the weakneſs of the thread of life in the early years, by the intemperance of manhood, by diſeaſe and accident, that not more than ſeventy-eight out of a thouſand die a natural death; yet, where human longevity is compared to the period of life of the other mammalia under ſimilar circumſtances, it will be ſoon diſcovered, that of all the complaints concerning the miſery of human life, none is more unfair than that of its ſhortneſs.

On the very intereſting ſubjects of the probabilities of life at different ages, the annual mortality in different countries and ſituations, the number of marriages, deaths, and births, the rate of increaſe of population, and the proportions deſtroyed in the different ways by which exiſtence is terminated, ſee Expectation *of Life*, Life-Annuities, and an excellent table by M. Dupré de St. Maur, drawn up from the liſts of twelve country pariſhes in France, and three in Paris, and publiſhed by Buffon, in his Hiſtory of Man, ſect. 5. Mortality, Marriage, and Population. For an account of individuals who have reached an unuſual age, and of the circumſtances, under which this has happened, ſee Haller's Elementa Phyſiologiæ, lib. xxx. ſection 3; the article Longevity in this Cyclopædia; and ſir John Sinclair on Health and Longevity, 4 vols. 8vo.

II. *Hiſtory of the Species.*

In the diverſity of the regions which he is capable of inhabiting, the lord of the creation naturally holds the firſt place among animals. His frame and nature are ſtronger and more flexible than thoſe of any other creature; and he dwells, without injury, in all ſituations on the ſurface of the globe. The neighbourhood of the pole and the equator, the higheſt mountains and the deepeſt rivers are occupied by him: his ſtrong but pliant body bears cold, heat, moiſture, light or heavy air; he can thrive any where, and runs into leſs remarkable varieties than any other animals which occupy ſo great a diverſity of abodes;—a prerogative ſo ſingular, that it is not to be overlooked.

What climates, what degrees of heat and cold can man bear? where does he live? and how is he able to endure ſuch various abodes? Is he indebted for this privilege to the ſtrength and flexibility of his organization, or, as Buffon aſſerts, merely to his reaſon? Does he conſtitute a diſtinct ſpecies; or is he allied in kind to the ourang-outang? How do climate, food, and ſimilar cauſes operate on him? Are theſe ſufficient to account for all the diverſities hitherto obſerved; or muſt we ſuppoſe that ſeveral individuals were originally created, each for its own climate? What country did he firſt inhabit, and what was the appearance of the original man? Did he go erect, or on all fours? was he a Patagonian, or an Eſkimau, Negro, or Georgian? Such are the important queſtions which we have to conſider in the preſent diviſion of the article;—queſtions, of which a full diſcuſſion would require a much greater extent and variety of knowledge than the writer can lay the leaſt claim to, as well as a much larger portion of ſpace than the limits of this work will allow. We muſt, therefore, be contented with exhibiting a few hints, rather than a complete view of the matter.

Abode of the human Species.—The ſituations occupied by man in the preſent times, extend as far as the known ſurface of the earth. The Greenlander and Eſkimau live in the eightieth, and even, perhaps, in ſtill higher degrees of north latitude.

latitude. Noogfack, a Danifh fettlement, lies in 72° north latitude; and the Greenlanders themfelves go much higher. Three Ruffians lived between fix and feven years on Spitzbergen, in latitude between 77° and 78°. See Dr. Aikin in the Manchefter Society's Memoirs, vol. i. p. 96. The Negro lives under the equator, and all America is inhabited even to Terra del Fuego. Cook difcovered land about the 58th and 60th degrees of fouth latitude, which he called Sandwich land; and a clufter of iflands as far as the 66th degree, on which he faw no men. Very probably there are no human inhabitants here: but it is fufficiently proved that places at leaft as cold are habitable. Perhaps we are not quite warranted in afferting that there are men in the interior of Africa; yet the accounts received from thofe on the coafts induce us to believe that thefe regions are in fome degree peopled. Hence we find that man is capable of exifting and propagating his fpecies in the hotteft and coldeft countries of the earth.

The greateft natural cold which has been afcertained by thermometrical meafurement, was that experienced by the elder Gmelin in the year 1735 at Jenifeik in 58 north latitude, and 110 eaft longitude (from Ferro). The mercury fell to 126 below 0. (Flora Sibirica, pref.) The fparrows and jays were killed. When Pallas was at Krafnaiarfk 56° north latitude, and 110° eaft longitude, the thermometer fell to 80° below 0; and the quickfilver froze in the bulb. A mafs of pure mercury, expofed in the open air, was frozen. (Travels in Ruffia, pt. 3.) Our own countrymen experienced apparently as fevere a degree of cold on the Churchill river in Hudfon's Bay. Brandy was frozen in the rooms where they had fires. (Phil. Tranf. N° 465.) Yet the Canadian favages and the Efkimau go to the chace in this temperature; and the inhabitants of the countries vifited by Gmelin and Pallas cannot remain conftantly in their houfes during their winters. Even Europeans, accuftomed to warmer climates, can undergo fuch cold as we have juft mentioned, and efcape unhurt, if they take exercife enough. The Danes have lived in Greenland in the 72° north latitude; and the Dutch, under Heemfkerk, wintered at Nova Zembla in 1597, in 76° north latitude. Some of them perifhed; but thofe who moved enough, and were in found health at firft, withftood the dreadful cold, which the polar bear (urfus maritimus), apparently born for thefe climes, feems to have been incapable of fupporting; for the journal ftates that, as foon as the fun finks below the horizon, the cold is fo intenfe, that the bears are no longer feen, and the white fox (canis lagopus), alone braves the weather. (Voy. de la Comp. des Indes, part i.) For an account of other examples, and particularly of one, in which three men remained for between fix and feven years in 78° north latitude, fee Dr. Aikin's Memoir, already quoted, concerning the attempts to winter in high northern latitudes.

The power of the human body to withftand fevere degrees of cold will appear in a more remarkable light, when we obferve what heat it is capable of bearing. Boerhaave afferted, that a heat of from 96° to 100° would be fatal to man. Adanfon faw the thermometer in the fhade at 108½ at Senegal in 17° north latitude; and Buffon cites an inftance of its being feen at 117½. Probably the country to the weft of the great defert is ftill hotter from the effect of the winds which have blown over the whole tract of its burning fands. When the firocco blows in Sicily, the thermometer rifes to 112°, according to Brydone. Dr. Chalmers obferved a heat of 115 in South Carolina, in the fhade: (On the Weather and Difeafes of South Carolina;) and Humboldt experienced a temperature from 110° to 115° in the Llanos or deferts near the Orinoco, in South America. (Tableau Phyfique des Regions Equatoriales.) Much greater degrees of artificial heat have been fupported. See HEAT, *Animal.*

Thus we fee that man can fuftain all poffible degrees of atmofpherical heat and cold. He has an equal power of fupporting varieties of preffure. We may reckon the ordinary preffure of the air, at the level of the fea, at 32,235 lbs. for the whole furface of the body; fuppofing the barometer to ftand at 30 inches. If we afcend to a height of 12,000 feet, (extenfive tracts in South America, inhabited by thoufands, have this height,) the barometer ftands at 20¼ inches, and the preffure is 21,750. Condamine and Bouguer, with their attendants, lived three weeks at a height where the barometer ftood at 15 inches 9 lines, and the preffure muft confequently have been 16,920. (Mem. de l'Acad. des Sciences, 1744.) In the Peruvian territory, extenfive plains occur at an altitude of 9000 feet; and three-fifths of the viceroyalty of Mexico, comprehending the interior provinces, prefent a furface of half a million of fquare miles, which runs nearly level at an elevation of from 6000 to 8000 feet. Mexico is 7475, and Quito 9550 feet above the fea. The hamlet of Antifana, 13,500 feet above the level of the fea, is the higheft inhabited fpot on the furface of our globe; but Humboldt afcended to 19,300 feet. (Tableau Phyfique des Regions Equatoriales; et Tableaux de la Nature.) There are no inftances of men living under a preffure much greater than we have juft mentioned: the depths to which the earth has been penetrated, in the operations of mining, are trifling in this point of view. In diving, however, the body is fubject to, and can bear feveral atmofpheres; as, on the contrary, in balloons, men have afcended beyond any point of elevation on the furface of the earth, and have confequently been expofed to a much more confiderable diminution of the ordinary preffure than what we have ftated above.

Food.—The great variety of fubftances, which man is not only capable of digefting, but from which his organs can extract wholefome nourifhment, contribute very effentially to his wide extenfion over the furface of the earth. We have already explained, under the article DIGESTION, that almoft the whole animal and vegetable kingdom afford food to man. Under particular circumftances, he can not only derive his nutriment exclufively from the animal kingdom, as in New South Wales, and in the Archipelago between Afia and America, from fifh; in the iflands to the fouth of Iceland, from fifh and puffins (fee fir G. Mackenzie's Travels in Iceland); but can confume what appears to us the moft filthy and difgufting objects. The Greenlander and the inhabitants of Alafka eat the whale, and can digeft this hard and revolting food without the affiftance of cookery. The former bury a feal, when they catch one, under the grafs in fummer, and the fnow in winter, and eat the half-frozen half-putrid flefh with as keen a relifh as the European finds in his greateft dainties. (Cranz Hift. of Greenland.) They drink the blood of the feal while warm, and eat dried herrings moiftened with whale oil. They mix frefh, putrid, and half-incubated eggs, whortle berries, and angelica, in a bag of feal-fkin, pour whale-blubber on it, and referve the infernal mixture as a delicacy for the winter. The people of admiral Monk, and fome Ruffians, caft away on one of the Aleutian iflands, greedily confumed the putrid remains of a whale; and the Greenlanders always difpofe of the whales ftranded on their coafts in this way, not defifting, however far putrefaction may have proceeded, till the whole is gone.

Even the earth, impregnated with the reliquiæ of animal and vegetable matter, affords food to fome favages. The Ottomaques, on the banks of the Meta and the Orinoco, feed

feed on a fat unctuous earth, or a species of pipe-clay tinged with a little oxyd of iron. They collect this clay very carefully, distinguishing it by the taste: they knead it into balls of four or six inches in diameter, which they bake slightly before a slow fire. Whole stacks of such provisions are seen piled up in their huts. Those clods are soaked in water, when about to be used; and each individual eats nearly a pound of the material every day. The only addition which they occasionally make to this unnatural fare, consists in small fish, lizards, and fern roots. The quantity of clay that the Ottomaques consume, and the greediness with which they devour it, seem to prove that it does more than merely distend their hungry stomachs, and that the organs of digestion have the power of extracting from it something convertible into animal substance. Humboldt Tableau Physique des Regions Equatoriales.

The researches of Meiners respecting food seem to have exhausted every accessible authority on the subject: his deductions, supported by an almost infinite number of quotations, exhibit so complete a view of the matter, that we present them to the reader in his own words. "The common positions concerning the earlier use of vegetables, and the effects of vegetable and animal food on the dispositions of people, have been brought forwards by men not acquainted with all the facts which history presents. There were formerly, and still are, many people, particularly among the dark coloured nations, who eat nothing, or almost nothing but flesh; and that with little or no preparation. Examples of this are afforded in Asia, by the Huns, Calmucks, and people of Thibet; by the Burates, Tungooses, Kamtschatkans, and eastern islanders; by the Ostiaks and Samoiedes, whom the Russians were obliged to imitate in Nova Zembla, and the Eastern ocean; by the Woguls, Circassians, Mingrelians, and Abcassas; and lastly, by some tribes in Babylon: in Europe, by the Alani, all the Celtic people, the Tartars of the Crimea, and even the inhabitants of St. Kilda: in America, by the Esquimaux, the Greenlanders, the North American savages, the Peruvians, and the inhabitants of Terra del Fuego: in Africa, by the Ethiopians and Gallas: in the southern countries, and the islands of the South Sea, by the New Hollanders, New Zealanders, and the inhabitants of the Friendly and Society islands.

"On the contrary, there have been, and still are, many people who live almost exclusively, or wholly on vegetables. Such are the Cretans, Spartans, and Romans, in certain periods; most of the Slavonic tribes; the Turks, Arabians, and Persians; the Mahometans, and still more the Brahmins in Hindoostan; the Chinese, Japanese, and certain of the Javanese; most of the Otaheitans, and inhabitants of the Marian islands; lastly, the Egyptians, Moors, Negroes, Hottentots, and inhabitants of Sennaar.

"The most common animal food is fish, which, in the warm climates of Asia and Africa, is seldom eaten except in a stinking or putrid state. After fish come pigs and dogs; then camels, mules, horses, and locusts. The southern people prefer smoked and salted, the northern fresh meat. The modes of preparation are very various: very few boil; most either dry or roast their flesh, and this in very different ways.

"Of vegetable foods, maize deserves the first place; then bananas, potatoes, yams, and other roots; rice, and millet. The history of our European corn is very obscure. Originally the corn was eaten either raw or roasted; or else it was pounded or bruised, and the meal taken, either raw, or roasted or boiled. Examples of these methods are still found. The vine, as well as some of our kinds of corn, are produced in much more southern countries than is commonly supposed.

"Of trees that produce fruits, those of the palm kind should be first mentioned; the sago and bread-fruit trees are much less widely extended. Many people eat acorns or chesnuts, or the rind or exuded juices of well known trees; or the pith, fruit, or roots of trees that we know little of. In other situations, moss or berries, or the roots and bulbs of known plants, have been employed. The fruit trees of our climates grow neither in the torrid nor in the frigid zones. The use of hot spices generally increases with the heat of the climate. The perfectly irregular meals of savages are less remarkable than the quick eating of the orientals.

"The orientals are the most moderate; all of Mongolian or mixed origin, in all climates, and even in the torrid zone, are the most voracious. Respectable writers bear testimony to this voracity in the Nogays, Tungooses, Baschkirs, and Kirgises; in the Greenlanders, Laplanders, and Fins; in the Hindoos, Tunquinese, and the inhabitants of Laos; in the Negroes and Hottentots; in the North and South Americans. There are situations, in which the appetite of new comers is much increased, or a greater quantity of food is required to support the bodily powers.

"These voracious people swallow with brutal avidity the most disgusting and difficultly digestible substances. The Calmucks devour putrid and stinking matters, the after-birth of animals, marmots, mice, otters, birds of prey, foxes, and wolves; but not dogs nor weasels. The Jakuts eat carnivorous animals; and the after-birth of their women is a delicious morsel, to which they invite their friends: they will not, however, touch frogs or pigs. The Tungooses and Ostiaks swallow slimy mud: the former also eat lice and the snot of their children. The Samoiedes eat putrid relics of horses, cats, dogs, whales, &c.; and the Kamtschatkans indigestible fungi. The women of the former used to eat the after-birth, that they might conceive again sooner. The Tschutskis and their guests drink the urine of the women; and the inhabitants of the Fox islands, besides lice, eat raw whale-blubber: they also lick themselves dry, after washing with urine. The Laplanders chew tobacco; stick it behind their ears, and then chew it again. The Tunquinese eat tigers, lions, snakes, bats, elephants, stinking and uncleaned fish; the Chinese, dead dogs, horses, and rats; the Arracanese, Siamese, and Formosans, besides such things, devour entrails, with all their contents. The inhabitants of the Bashee islands in the Indian ocean, who are in other respects cleanly, consider the contents of a goat's stomach as a great luxury. Crocodiles, eagles, ostriches, hippopotami, serpents, raw and putrid buffaloes and elephants, uncleaned entrails, toads, rats, and worms, the most stinking carcases, chalk, and earth, are eaten by the Negroes. The Bosjesmen make themselves fat with ants, and maggots of wood; and, like the Negroes, are fond of elephants' flesh, which they cut in pieces, and dry in the sun. The women of the Americans free each other from vermin, and eat them; and the contents of a rein-deer's stomach, mixed up with whale-oil or bears'-grease, is deemed a bonne bouche by the Greenlanders. They also cook fish with blubber, chewing them, and spitting them into the vessels, that nothing may be wasted: they stroke off the sweat with their fingers, and swallow it. The Californians not only consume lice, uncleaned entrails, serpents, lizards, insects of all kinds, maggots from rotten wood, spoiled corn full of worms, but also dry leather and clay; undigested grains of the pitochaias, which they get from human excrement; and lastly, rats and mice, which they put on the fire

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for a ſhort time, and then ſwallow quite bloody. Beſides other matters, the Braſilians and Chileſe eat the bleeding hearts of their enemies; and the former alſo the bodies and broken bones of their children and leaders. The Caribs, and other people on the Orinoco, like the Negroes, eat chalk and clay; and make with them, and ſpoiled maize, balls which they moiſten with turtle fat, and ſwallow with great delight.

"Almoſt all people, even the wildeſt and moſt ſtupid, have deviſed methods for intoxicating or ſtupifying themſelves. For this purpoſe they either ſmoked or chewed leaves or herbs, in ſome inſtances. The orientals, who poſſeſſed the weſtern half of ſouthern Aſia, and the north-weſt ſide of Africa, have from early times preferred the uſe of opium; and the ſouth-eaſt nations, and their colonies, that of betel. The orientals and the Eaſt Indians drink wine to exceſs; but they prefer the ſpirit extracted from ſugar or rice, or ſtill ſtronger liquors. The Ruſſians in Siberia, and the European coloniſts in the torrid zone, drink brandy in great quantities. Palm and honey wine are very common in hot countries. There is ſcarcely any herb or vegetable production, and much leſs any article of vegetable food, from which intoxicating drinks have not been extracted. Bread, malt, meal, fruit, ſago, caſſava (juca dulce et amarga), potatoes, the aloe (agave americana), millet, and mares' milk, have been uſed for this purpoſe. The chica of the Americans, of which maize is the baſis, is the moſt diſguſting liquor. Very few people have been entirely unacquainted with boiling liquors: the love of theſe, however, ſeems particularly ſtrong in the ugly races of Aſia and America." Meiners' Grundriſs, p. 140—162.

On the ſubject of eating human fleſh, ſee the articles Cannibal and Anthropophagi.

In almoſt all ages there have been diſputes concerning the food beſt ſuited to the nature of man; whether a mixed diet, or one purely animal or vegetable, is moſt favourable to the developement of the bodily and mental powers. "The Pythagorean diet," ſays Buffon, "though extolled by ancient and modern philoſophers, and even recommended by certain phyſicians, was never indicated by nature. If man were obliged to abſtain totally from fleſh, he could not, at leaſt in our climates, either exiſt or multiply. An entire abſtinence from fleſh can have no effect but to enfeeble nature. To preſerve himſelf in proper plight, man requires not only the uſe of this ſolid nouriſhment, but even to vary it. To obtain complete vigour, he muſt chooſe that ſpecies of food which is the moſt agreeable to his conſtitution; and as he cannot preſerve himſelf in a ſtate of activity but by procuring new ſenſations, he muſt give his ſenſes their full ſtretch, and eat a variety of meats, to prevent the diſguſt ariſing from an uniformity of nouriſhment." We are told, on the other ſide, that, in the golden age, man was as innocent as the dove; his food was acorns, and his beverage pure water from the fountain: finding every where abundant ſubſiſtence he felt no anxieties, but lived independent, and always in peace both with himſelf and the other animals. But he no ſooner forgot his native dignity, and ſacrificed his liberty to the bonds of ſociety, than war and the iron age ſucceeded that of gold and of peace. Cruelty and an inſatiable appetite for fleſh and blood were the firſt fruits of a depraved nature, the corruption of which was completed by the invention of manners and arts. Either immediately, or remotely, all the phyſical and moral evil, by which individuals are afflicted and ſociety laid waſte, aroſe from theſe carnivorous practices.

We cannot give our approbation to either of theſe repreſentations, both of which are contradicted by the only criterion in ſuch queſtions, an appeal to experience. That men can be perfectly nouriſhed, and that their phyſical and intellectual capabilities can be fully developed in any climate, by a diet purely vegetable, has been proved by ſuch abundant experience, that it will not be neceſſary to adduce any formal arguments on the ſubject. The repreſentations of the Pythagoreans are the mere offſpring of imagination. We have not the ſhadow of a proof that this ſtate of ideal innocence, of exalted temperance, of entire abſtinence from fleſh, of perfect tranquillity, of profound peace, ever exiſted, or that it is more than a fable deſigned to convey to us moral inſtruction. If the experience of every individual were not ſufficient to convince him, that the uſe of animal food is quite conſiſtent with the greateſt ſtrength of body and of mind, the truth of this point is proclaimed by the voice of all hiſtory. A few hundreds of Europeans hold in bondage the vegetable eating millions of the Eaſt. We ſee the carnivorous Romans winning their way, from a beginning ſo inconſiderable, that it is loſt in the obſcurity of fable, to the empire of the world; we ſee them, by the power of intellect, eſtabliſhing that dominion which they had acquired by the ſword, and furniſhing ſuch compoſitions in poetry, oratory, philoſophy, and hiſtory, as are at once the admiration and deſpair of ſucceeding ages: we ſee our own countrymen rivalling them in arts and in arms, exhibiting no leſs ſignal bravery in the field and on the ocean, and diſplaying in a Milton and Shakſpeare, in a Newton, Bacon, and Locke, in a Chatham, Erſkine, and Fox, no leſs mental energy: yet, with theſe proofs before their eyes, men are actually found, who would have us believe, on the faith of ſome inſulated, exaggerated, and miſrepreſented facts, and ſtill more miſerable hypotheſes, that the developement, form, and powers of the body are impaired and leſſened, and the intellectual and moral faculties injured and perverted by animal diet.

The preſent ſeems a very proper place for conſidering a queſtion, that is frequently agitated on this ſubject; whether man approaches moſt nearly to the carnivorous or herbivorous animals in his ſtructure? We naturally expect to find, in the figure and conſtruction of the teeth, a relation to the kind of food which an animal ſubſiſts on. The carnivorous have very long and pointed cuſpidati or canine teeth, which are employed as weapons of offence and defence, and are very ſerviceable in ſeizing and lacerating their prey: theſe are three or four times as long as the other teeth in ſome animals, as the lion, tiger, &c. and conſtitute very formidable weapons. The grinding teeth have their baſes elevated into pointed prominences; and thoſe of the lower ſhut within thoſe of the upper jaw. In the herbivorous animals, theſe terrible canine teeth are not found, and the grinders have broad ſurfaces, oppoſed in a vertical line to each other in the two jaws: enamel is generally intermixed with the bone of the tooth in the latter, and thus produces ridges on the grinding ſurface, by which their operation on the food is increaſed: in the former, it is confined altogether to the ſurface. For further details on this ſubject, ſee Mammalia. The articulation of the lower jaw differs very remarkably in the two kinds of animals: in the carnivorous, it can only move forwards and backwards; in the herbivorous it has, moreover, motion from ſide to ſide. Thus we obſerve, in the fleſh eaters, teeth calculated only for tearing, and ſubſervient, in part at leaſt, to the procuring of food, as well as to purpoſes of defence, and an articulation of the lower jaw that precludes all lateral motion: in thoſe which live on vegetables, the form of the teeth, and the nature of the joint, are calculated for the lateral

ral or grinding motion: the former ſwallow the food in maſſes, while in the latter it undergoes conſiderable comminution before it is ſwallowed. The teeth of man have not the ſlighteſt reſemblance to thoſe of the carnivorous animals, except that their enamel is confined to the external ſurface: he poſſeſſes, indeed, teeth called canine, but they do not exceed the level of the others, and are obviouſly unſuited to the purpoſes which the correſponding teeth execute in carnivorous animals. Theſe organs, in ſhort, very cloſely reſemble the teeth of monkies, except that the canine are much longer and ſtronger in the latter animals. In the freedom of lateral motion, the lower jaw of the human ſubject reſembles that of herbivorous animals. In the form of the ſtomach again, and, indeed, in the ſtructure of the whole alimentary canal, man comes much nearer to the monkey than to any other animal. The length and diviſions of the inteſtinal tube are very different according to the kind of food employed. In the proper carnivorous animals the canal is very ſhort, and the large inteſtine is cylindrical; in the herbivora, the former is very long, and there is either a complicated ſtomach, or a very large cæcum and a ſacculated colon. In comparing the length of the inteſtines to that of the body in man, and in other animals, a difficulty ariſes on account of the legs, which are included in the former, and left out in the latter: hence the comparative length of the inteſtinal tube is ſtated at leſs than it ought to be in man. If allowance be made for this circumſtance, man will be placed on nearly the ſame line with the monkey race, and will be removed to a conſiderable diſtance from the proper carnivora. Soemmerring ſtates that the inteſtinal canal of man varies from three to eight times the length of the body. (De Corp. Hum. Fab. t. 6. p. 200.) In Tyſon's chimpanſee of 26 inches, the canal meaſured 159 inches, which is about ſix times the length of the body: in two ſapajous and two monkies, the inteſtines were reſpectively 62 and 96 inches, which muſt be conſiderably ſhorter in proportion, although the length of the body is not mentioned. P. 32.

The following are the comparative lengths of the canal and body in ſeveral ſimiæ, according to Cuvier, t. 3 p. 448. As the hind limbs are not included in the length of the body, it will be immediately apparent that the alimentary canal of theſe herbivorous animals is generally ſhorter than that of man.

	Body.	Inteſtinal Canal.
Gibbon (ſimia longimana) - - - -	1	8
Sajou (cercopithecus) - - - -	1	6
Coaita (S. paniſcus) - - - -	1	6.3
Patas (S. patas) - - - - -	1	6.5
Callitriche (S. ſabea) - - - -	1	6
Malbrouk (S ſinica, Bonnet chinois) -	1	6
Macaque (S. cynomolgus) - - -	1	6.7
Magot (Barbary ape, S. inuus) - -	1	5.4
Mandril (Ribbed-noſed baboon, S. maimon)	1	8.2

Man poſſeſſes a tolerably large cæcum, and a cellular colon, which we believe is found in no carnivorous animal. In general, then, the human teeth and joint of the jaw reſemble moſt thoſe of herbivorous animals: and man approaches moſt nearly in theſe, as well as in other points, to the monkey race, which are, in their natural ſtate, completely herbivorous.

In ſtating theſe circumſtances, we do not wiſh our readers to draw the inference, that man is deſigned by nature to feed on vegetables. The differences between him and other animals, render it difficult to apply to him reaſonings drawn from them. The hands of man, and particularly his arts, procure for him the food which carnivorous animals earn by their teeth. The proceſſes of cookery bring what he eats into a different ſtate from that in which it is employed by either carnivorous or herbivorous animals. Hence the analogy is too looſe for us to place much confidence on the reſults of theſe comparative views. We muſt truſt to experience alone for elucidating the great problem of diet: but the experimental mode of inveſtigation is ſo difficult; mankind are ſo averſe to relinquiſh long habits, and there are ſo many other cauſes affecting human health, that we are by no means ſanguine in our expectations of important reſults. Before we can venture to draw any inferences on a ſubject, beſet with ſo many obſtacles, we want to know the effects of a purely animal diet on ſeveral individuals of different habits. We muſt have accurate reports of their ſtate, both bodily and mental, and muſt learn the condition of two or three ſucceeding generations fed in the ſame way. A ſimilar ſtatement will be neceſſary on the operation of a ſtrictly vegetable diet. The drink, too, is an important conſideration. For further remarks on this ſubject, ſee Corpulency and Diet.

Abodes and Dreſs of various Nations.—We ſhall employ on this ſubject the obſervations of Meiners, who has collected his materials from every acceſſible ſource of information, both ancient and modern, and ſubjoined the numerous authorities from which they are derived.

Abodes.—There have been more people than is commonly ſuppoſed, without any, or at leaſt without any ſecure and protecting dwelling; and theſe were, without exception, dark coloured or ugly nations; ſuch were the Fenni of Tacitus, the ſavages about Hudſon's Bay, northwards from the river St. Laurence, and in North America in general, the Californians, Peruvians, the Indians near Garcias de Dios, the Braſilians, thoſe on the Oronoco and Maranon, the New Hollanders, ſome of the New Zealanders, ſome ſavages near Abyſſinia, and in Natal.

The firſt ſtep was made by thoſe who built huts incloſed on all ſides, but ſuch as were eaſily covered with leaves or branches, bark of trees or ſkins, and therefore admitted of being ſeparated and conveyed from place to place. Almoſt all the inhabitants of northern Aſia, Europe, and America; the Burates, and Tungooſes; the Samoiedes, Jakuts, and Oſtiaks; the Greenlanders, Laplanders, and people about Hudſon's Bay; the Chileſe, and ſome ſavages in Louiſiana; and the loweſt inhabitants of Sumatra, Arabia, and Hindooſtan, have ſuch huts.

More ſolid and perfect edifices were conſtructed with beams, or ſtones, or woodwork; the walls covered with earth. In this way the Greeks, Germans, and Slavons of ancient times built; the ſame method is adopted ſtill by the Morlachians, the inhabitants of ſeveral German and Turkiſh provinces; the Finnic and mixed races in Europe and Aſia; the Ruſſians and Icelanders; ſeveral ſavages in America; moſt of the Negroes; the Cabyles and Moors in Africa, ſeveral of the Arabians, and Perſians, Hindoos, Ceyloneſe, Chineſe, and Japaneſe.

The mode of building is modified by various cauſes. Conſtant danger taught the nations of the middle ages, the Greeks of the iſlands, the Mingrelians, the inhabitants of Sumatra, the Baſhee iſlands, New Zealand, &c. to provide themſelves with the means of ſafety. Thoſe who are expoſed to earthquakes, inundations, vermin, rapacious animals, will build differently from ſuch as know nothing of theſe evils. Extreme heat and cold of the climate require different methods; paſtoral and agricultural people will lodge themſelves very differently. There are many reaſons

why

why this part of the world has produced chef-d'œuvres of architecture, and why the subjects of the despots of Europe, Asia, and Africa, are worse off in their houses than the free subjects of the more happy states. In comparing the descriptions of the dwellings and cities of the Turks, Moors, Persians, Arabians, Hindoos, Siamese, Tunquinese, Chinese, inhabitants of Thibet, Formosans, and Japanese, we cannot help wondering at the remarkable uniformity of architecture in such different nations. The most uncultivated people in Africa and America had public buildings." Meiners Grundriss, chap. 5.

Dress and Ornament.—"As there have been people, without any secure habitation, so there have been many without any dress, or at least such as covered the greatest part of the body. The Celtic nations were formerly naked or nearly so; and this is the case at present with the Mingrelians, the inhabitants of Terra del Fuego and their neighbours, and the New Hollanders. The savages of California, Louisiana, the isthmus of Darien, Guiana, Brazil, and Paraguay, several islands of the South Sea, and several negroes, go also naked.

The place of clothing is supplied in the naked people by smearing the body with oil or grease, generally mixed with coloured earths or plants. Painting of the whole body, or of parts, and particularly of the face, has been a chief object and employment of vanity with nearly all the savage people of the world. One or the other was practised by the Celts, Persians, and Medes: the custom still prevails in Asia among the Brahmins, Hindoos, and their women; among the females of the Arabians, Persians, Turks, Armenians, Egyptians, and Mingrelians, to whom we may add those of the Greeks, Walachians, and Russians; also the Chinese, Peguans and Siamese, the New Hollanders, New Zealanders, inhabitants of several South sea islands, and the Kamtschatkans; the Negroes and Hottentots, and all the wild Americans, both north and south. The practice of puncturing and tattooing the skin, performed with very various objects, and on very different parts, has not been less universal; we find, at least, that it has existed among the Celts, the Egyptians, Syrians, Brahmins, and Arracanese, the Turks, Arabians, Moors, and the Formosans, the Tungooses, Ostiaks, Greenlanders, and eastern islanders, the North and South Americans, and the South sea islanders. Instead of punctures and lines incisions with a knife were made in some instances.

Great attention has generally been paid to decorating the hair, to changing its colour by powders and grease, to curling it in various ways, or adorning it with feathers and other articles. The women of the Greeks and Romans, even in their times of simplicity, were distinguished in this way, also the Turks and Moors and their women, the southern islanders, most of the negroes, and nearly all the American savages. Several people, from their notions of beauty, have employed themselves in staining, filing, and otherwise decorating their teeth: also in colouring and encouraging the growth of their nails. Still more extraordinary attempts at personal decoration have been made by the Giaga women, several negroes of both sexes, the Carib women, the Gallas, and the natives of Natal.

With the view of beautifying the person, the ears and nose have been perforated, and the lips and cheeks either slit up, or perforated. The latter practice has been observed chiefly in the inhabitants of the eastern islands, and the savages of Paraguay and Brazil; but it was much more common to make holes in the ears or nose, to hold rings or other ornaments. This was carried no where so far as in south America, the eastern islands, and those of the south sea. The taste for rings, not only in the ears and nose, but also about the neck, arms, legs, body, &c. prevails still chiefly in Africa and Asia, where it has existed from the earliest times. The Europeans also, in the dark ages, took pleasure in sounding and heavy ornaments. The decoration of the female head was formerly, and still continues, the most complex and heavy, in the oriental nations of Asia, and the mixed people of Siberia. The astonishing ornaments made of feathers are among the peculiarities of the Americans.

The inhabitants of cold climates resemble each other in their dress more nearly than those of warm ones. The latter wear either an apron or shirt, with or without breeches, mantle, and pelisse or covering of fur. The southern people distinguish themselves by having the head either covered or naked. Women have generally been clothed like the men. Leather and felt, and the most simple kind of weaving, appear to be all of nearly equal antiquity. Barbarous people generally like the most lively colours, but here, as in most other remarks on man in general, there are many exceptions. Ibid. ch. 6.

Does Man constitute a distinct Species?—The differences between man and animals constitute a very important subject in his natural history. We feel here, what we have often occasion to observe in the study of natural history, and particularly of zoology, that it is much easier to perceive, as it were intuitively, the distinctive characters of two neighbouring species of animals, than to express them in words. Thus we readily discern the difference between the rat and the mouse, the hare and the rabbit, though it would be much more difficult to describe clearly the characteristic marks on which that difference rests. That this kind of difficulty exists in the present subject has been candidly confessed by some great men. Linnæus, whose sagacity in perceiving the characteristic marks of the various objects of natural history, and in expressing them in appropriate language, has never been exceeded, observes in the preface of his Fauna Suecica "rem perquam arduæ indaginis esse propriam tradere hominis differentiam specificam; et nullum se hactenus characterem eruere potuisse, unde homo a simia internoscatur." In the Systema Naturæ he again says, "mirum adeo parum differre stultissimam simiam a sapientissimo homine, ut iste geodætes naturæ etiamnum quærendus, qui hos limitet;" accordingly he gives neither the generic nor specific character of man in that work, but puts him on a level with the long-armed ape, (under the name of homo lar.)

Other authors have distinctly asserted the opinion that man and the monkey, or ourang-outang, belong to the same species, and are no otherwise distinguished from each other, than by circumstances, which can be accounted for by the different physical and moral agencies to which they have been exposed. (Monboddo on the Origin and Progress of Language, vol. i. and Ancient Metaphysics, vol. iii. Rousseau sur l'Inegalité des Conditions, note 10.) The former of these writers even supposes that the human race once possessed tails; and he says "the ourang-outangs are proved to be of our species by marks of humanity that I think are incontestible." The latter conceives that the observations of travellers, concerning various animals of the monkey kind, prove the existence of wild men. "Toutes ces observations sur les variétés que mille causes peuvent produire et ont produit en effet dans l'éspece humaine, me font douter si divers animaux semblables aux hommes, pris par les voyageurs pour des bêtes sans beaucoup d'examen, ou a cause de quelques différences qu'ils remarquoient dans la conformation exterieure, ou seulement parceque ces animaux ne parloient pas, ne seroient point en effet de veritables hommes sauvages, dont la race

race difperfée anciennement dans les bois n'avoit eu occafion de développer aucune de fes facultés virtuelles, n'avoit acquis aucun degré de perfection, et fe trouvoit encore dans l'état primitif de nature."

Other writers, who have pleafed themfelves with defcribing what they call a regular gradation or chain of beings, reprefent man only as a fuperior kind of monkey; and place the unfortunate African as the connecting link between the fuperior races of mankind and the ourang-outang. (White's account of the regular gradation in man and animals, &c. 4to. London 1779.) The precife meaning of the word gradation, in this mode of employing it, we do not underftand, nor do thofe who ufe it favour us with any definition of a term fo very important in fettling the queftion: we conceive the meaning to be that man is not a race originally diftinct from monkies. That the flave merchant, who traffics in human blood, and the negro-driver, who ufes his fellow creatures worfe than brutes, fhould endeavour to juftify their conduct by depreffing the African to a level with the brute, is what we might reafonably expect, as well as to hear the flave traffic commended becaufe it imparts to the negroes the bleffings of Chriftianity: but we fhould not have expected to find fuch opinions defended by the natural hiftorian: and we fhall not hefitate to affert that they are as falfe philofophically, as the moral and political confequences, to which they would lead, are fhocking and deteftable. We fet out with this pofition, that man has numerous diftinctive marks, by which, under every circumftance of roughnefs and uncivilization, and every variety of country and race, he is feparated by a broad and moft clearly defined interval from every other animal, even of thofe fpecies which, from their general refemblance to the human fubject, have been called anthropo-morphous. We cannot, indeed, by any means coincide with thofe moderns who have indulged their imaginations in painting a certain continuity or gradation of created beings; and who fancy they have difcovered great wifdom of the creator, and great wifdom of the creation in this refpect; that nature makes no leaps, but has connected the various objects of the three kingdoms with each other like the fteps of a ftair-cafe, or the links of a chain. The candid and unprejudiced obferver muft allow, that in the animal kingdom there are whole claffes, as birds, and particular genera, as the cuttlefifh, which cannot find a place in fuch a fcheme of arrangement without a very forced and unnatural introduction: and again, that there are certain genera, as the coccus, where the two fexes are fo different from each other, that the male and female muft be feparated, and occupy different parts of the fcale in this artificial plan of gradation.

The completely unfupported affertions of Monboddo and Rouffeau only fhew that they are equally ignorant of the ftructure and characters of men and monkies, and that they know nothing of the laws, according to which the deviations of an animal from the original ftock take place. We fhould not wafte a moment in refuting what is not defended by a fingle proof. But the fubject is important and very interefting and we fhall therefore confider at fome length what are the fpecific characters of man.

In this part of our fubject we fhall have frequent occafion to mention the ourang-outang, and therefore think it neceffary to obferve, that two diftinct fpecies have been confounded under this common appellation. Linnæus, Buffon, and Erxleben, have not rectified this miftake, although Blumenbach had long ago pointed it out. The latter author, in his manual of natural hiftory, defcribes, under the name of fimia troglodytes, the animal of which Tyfon, in his anatomy of the pigmy, has given fo excellent an anatomical defcription. It is found in Angola, Congo, and the interior of Africa, and, as well as the following, reaches about the fize of a boy eight years old. It is called chimpanfee, and has been defcribed by the names pongo, jocko, and barris. It is diftinguifhed by its black hair and very large ears; and has a nail on the thumb of the hind hand. The fimia fatyrus is the proper ourang-outang (which word, in the Malay language, means man of the woods), is found in the ifland of Borneo, and is the animal diffected by Camper. It has reddifh-brown hair, and no nail on the thumbs of the hind hands.

Diftinctions between Man and Animals.—The circumftances which diftinguifh man from other animals, may be confidered under the divifions of 1, external conformation; 2, internal ftructure; 3, functions of the animal economy; 4, faculties of the mind; 5, difeafes; 6, alleged, but not well-grounded differences.

1. *External Conformation; erect Stature.*—Under the firft head we remark, as the moft diftinguifhing peculiarity of man, his erect ftature: that majeftic attitude which announces his fuperiority over all the other inhabitants of the globe. He is the only being adapted by his natural formation to the upright pofition. Enflaved to their fenfes, and partaking merely of phyfical enjoyments, other animals have the head directed towards the earth: "quæ natura prona atque ventri obedientia finxit." Man, whofe more elevated nature is connected to furrounding objects by moral relations, who can embrace in his mind the fyftem of the univerfe, and follow the connections of caufes and effects, boldly regards the heavens, and can direct his fight even into the ftarry regions.

> "Pronaque cum fpectent animalia cetera terram,
> Os homini fublime dedit; cœlumque tueri
> Juffit; et erectos ad fidera tollere vultus."

In confidering this diftinction, it will be neceffary for us to prove two points: 1, that the erect ftature is fuited to the organization of the human fubject; 2, that it is peculiar to man.

Erect Attitude fuited to the human Organization.—The former is clear from what we fhall obferve afterwards, concerning the arrangement of certain parts of the human frame; it is not lefs evinced by the invariable practice of all nations in all ages of the world. The individuals of no nation, even in the wildeft ftate, have ever gone on all fours; and no animal has ever altered its gait. The chief fupport of this notion concerning the human fubject being defigned to fupport the body on four limbs, has been derived from the examples of children loft in woods and growing up in a wild ftate. Can we conceive any thing more widely removed from the natural condition of man than thefe wretched individuals? and might we not as well adopt any monftrous birth for a model of the human form, as draw our notions of attitude and way of life from thefe fpecimens? Moreover, if we look attentively into the moft authentic accounts of thefe wild men, we fhall find, that in the leaft fufpicious inftances they were erect; as for inftance, Peter the wild boy (Blumenbach in Voigt's Magazin fur Phyfik, &c. v. iv. pt. 3. p. 91. Monboddo Ancient Metaphyfics, v. iii. p. 57 and 367.), the girl defcribed by Condamine (Hiftoire d'une jeune fille Sauvage, Paris, 1761, 12mo.), a man found in the Pyrenées (Leroy fur l'Exploitation de la Nature dans les Pyrenées, London, 1776, 4to. p. 8.); and the young favage of Aveyron (Hiftorical Account of the young Savage of Aveyron, London, 12mo.) On the other hand, where they have been defcribed as going on all-fours, many circumftances of a very fufpicious kind will be detected in the narrative, as in the account of the juvenis ovinus Hibernus of Linnæus: we cannot therefore help fufpecting that Linnæus's homo fapiens ferus has no more claim to the epithet *tetrapus* than to that of hirfutus.

That the ftructure of the human body is adapted to the erect attitude, may be deemed fo clear as to need no proof: but two refpectable authors have defended the contrary paradox (Mofcati von der körperlichen wefentlichen unterfchiede zwifchen der Structur der Thiere und der Menfchen; Göttingen, 1771, 8vo. and Schrage in a Dutch Journal.)

Structure of the lower Limbs.—The fupport of the trunk upon the two lower limbs, and its being moved by the mufcles of thofe limbs, lead us to expect great peculiarities in their ftructure. We find accordingly, that man is diftinguifhed by the great length of the legs in comparifon to the trunk and to the arms. Daubenton's affertion, that no animal but man has lower extremities equalling the trunk and head together in length, is nearly correct: (the kanguroo, jerboa, &c. form exceptions, but do not invalidate the affertion fo far as regards our prefent purpofe.) The hind limbs of the ourang-outang fall very far fhort of this proportion. This length of the legs, which is fo convenient in our erect attitude, makes us altogether unfit for going on all-fours, as any perfon will immediately difcern by making or obferving a trial: the limbs in fuch an experiment muft be thrown obliquely backwards, or the articulations held in a bent and very infecure pofition. Even children, before they can walk, in whom the lower limbs are comparatively fhorter than in adults, crawl upon their knees, or elfe drag the lower extremities after them on the ground. The feet of man are much broader than thofe of any animal, and admit of being feparated more widely from each other. The fources of the latter prerogative refide in the fuperior breadth of the human pelvis, and in the length and obliquity of the neck of the femur, which, by throwing the body of the bone outwards, difengages it from the hip-joint. The whole tarfus, metatarfus, and toes, reft on the ground in the human fubject, and afford an ample bafe of fupport for the body. The fimiæ and the bear have the end of the os calcis raifed from the furface; while, on the contrary, it projects in man, and its prominent portion has a moft important fhare in fupporting the back of the foot: it is larger and more prominent in man than in any animal. The thigh-bone is ftraight, and its two condyles of equal length in the ourang-outang. The thigh is placed in the fame line with the trunk in man; it always forms an angle with the fpine in animals; and this is often even an acute one: the unfteadinefs of the erect attitude, and the difficulty of maintaining the equilibrium under fuch an arrangement, are too obvious to need any particular explanation.

Not only the length, but alfo the remarkable ftrength of the legs, when contrafted with the flender arms, clearly fhew that the former are defigned for fupporting and moving the body. And here we may adduce a further argument drawn from the progrefs of offification. The bones of the tarfus, and particularly the os calcis, offify at an earlier period, and advance more rapidly in their developement than thofe of the carpus. Very little ftrength of hand is required in the firft years of life, while the feet, at the end of twelve months, begin to be employed in fuftaining the body, and advancing it by progreffive motion.

The Mufcles.—The extenfor mufcles of the ankle joint, and chiefly thofe which form the calf of the leg, are very fmall in the mammalia, even in the genus fimia. The peculiar mode of progreffion of the human fubject accounts fufficiently for their vaftly fuperior magnitude in man. By elevating the os calcis, they raife the whole body in the act of progreffion; and, by extending the leg on the foot, they counteract that tendency, which the weight of the body has to bend the leg in ftanding. Hence Ariftotle, and others after him, very juftly obferved, that true calves of the legs can be afcribed to man only. See GASTROCNEMIUS and MUSCLE, under the head of *Standing and walking*.

The extenfors of the knee are much ftronger in the human fubject than in other mammalia; as their double effect of extending the leg on the thigh, and of bringing the thigh forwards on the leg, forms a very effential part in the human mode of progreffion. The flexors of the knee are, on the contrary, ftronger in animals; and are inferted fo much lower down in the tibia (even in the fimia) than in the human fubject, that the fupport of the body on the hind legs muft be very infecure, fince the thigh and leg form an angle, inftead of being continued in a ftraight line.

Upper Limbs.—A very curfory infpection of the upper limbs will convince us, that, whether we regard the fituation and mode of their connection to the trunk, or the direction and arrangement of the articulations throughout, they are entirely unfuited to the office of fupporting the body, and as well calculated for the ufes to which we put them, of feizing and holding objects, and thereby executing, befides all the proceffes of the arts, a thoufand minute but moft ferviceable actions of conftant recurrence. The arms, inftead of falling perpendicularly under the anterior part of the trunk, are thruft outwards by the clavicles; the glenoid cavities of the fcapulæ, inftead of being directed downwards, as in quadrupeds, look outwards: the elbows bend outwards, inftead of forwards, &c.

Thorax.—The whole arrangement of the thorax fhews man to be a biped. Thofe quadrupeds which have long legs, have a thorax compreffed at the fides, narrow and keel-fhaped in front, confequently deep from the fpine to the fternum, but confined in the tranfverfe dimenfion, and they are deftitute of clavicles, fo that the front legs come together, and fupport with greater firmnefs and facility the front of the trunk. They poffefs moreover a longer fternum, or a greater number of ribs (18 in the horfe), which advance nearer to the crifta of the os innominatum, for the purpofe of fupporting the abdominal vifcera in the horizontal pofition of the trunk. Even in the ourang-outang, the meafurement of the thorax from fpine to fternum exceeds that from fide to fide. (Œuvres de P. Camper. i. p. 115.) All thefe particulars are different in man. His thorax is flattened in front, very broad, but fhallow from before backwards: the humeri are thrown to the fides of the trunk, and thus acquire a more extenfive range in their motions: the fternum is fhort, and the abdomen unprovided with bony fupports in a very great fhare of its furface. Thefe, with other points which cannot efcape obfervation, when the fkeleton of any rather long-legged quadruped is compared to that of man, fhew how unfit he is for the attitude on all fours, which in his cafe can never be otherwife than unfteady, irkfome, and fatiguing in the higheft degree.

Pelvis.—The peculiarities of the human pelvis afford a ftrong confirmation of what we have already ftated. The form of this part is very characteriftic in man, and enables us to diftinguifh him from the anthropo-morphous fimiæ, and indeed from all the other mammalia. Although it might found paradoxical and affected, yet we could defend the affertion that the human fkeleton alone has a proper *pelvis;* that is, fuch a connection of the facrum and coccyx with the offa innominata, as forms a cavity refembling a bafon; from which the elongated offa innominata of other mammalia differ toto cœlo. In the ourang-outang and elephant we find the nearest approach to the human formation: in the former, however, the upper part of the ileum is narrow and elongated, stretching upwards in the direction of the spine, and its length exceeds its breadth, so that the relations of these two dimensions are very different in man and this animal. The height of the whole pelvis, from the tuber ischii to the anterior spine of the ileum, is 7 in. 3 li. in man, and 6 in. in the ourang-outang; its breadth between the two anterior spines in the former 10 in. 6 li.; in the latter 6 in. 6 li.: in the latter the symphysis pubis is very deep: and in both, there is neither that incurvation of the sacrum from its promontory dowawards, nor that direction of the coccyx towards the front, which, with the broad, horizontal expansion of the ilia, and the slenderness of the symphysis pubis are peculiar to the human frame, and constitute a broad and firm basis for the trunk, on which the weight of the abdominal contents is supported. The sacrum of the ourang-outang is flat and contracted, and continued in a straight line with the vertebral column.

Further Proofs.—Such then are the supports by which the trunk of the human body is firmly maintained in the erect position, and such are the properties of the trunk contributing to the same end. The breadth of the human pelvis affords a firm basis, on which all the superior parts rest securely; the same part is so narrow in other animals, that the trunk represents an inverted pyramid: there must consequently be great difficulty in maintaining it in a state of equilibrium, if it were possible for the animal to assume the erect position. In those instances where the pelvis is broader, the other conditions of the upright stature are absent: the bear, however, forms an exception to this observation, and consequently may be taught to stand and walk erect, although the posture is manifestly inconvenient and irksome to the animal. When quadrupeds endeavour to support themselves on the hind extremities, as, for instance, for the purpose of seizing any objects with the fore-feet, they rather sit down than assume the erect position. For they rest on the thighs as well as on the feet, and this can only be done where the fore-part of the body is small, as in the simiæ, the squirrel, &c.: in other cases the animal is obliged to support itself by the fore-feet also, as in the dog, cat, &c.

The perpendicular position of the vertebral column under the centre of the basis cranii, and the direction of the eyes and mouth forwards, would be as inconvenient to man, if he went on all fours, as they are well adapted to his erect stature. In the former case he would not be able to look before him; and the great weight of the head, with the comparative weakness of the extensor muscles, and the want of ligamentum nuchæ, would render the elevation of that organ almost impossible. See CRANIUM, under the head of "comparison of the human skull with that of animals," and HEAD.

Every part of the skeleton would lead to the same inference on this subject: but we forbear to enter into further detail, as being unnecessary. The reader will meet with some observations on this subject in the articles EXTREMITIES and MUSCLE.

The relation of the neighbouring soft parts to the pelvis deserves our consideration. Its posterior surface gives origin to the glutei muscles, of which the exterior (glutei magni), exceeding in size all others in the body, and covered by a remarkable stratum of fat, form the buttocks, which, by their ample, fleshy, and convex protuberances, conceal the anus, and are accounted, both by the classical authors in natural history, as Aristotle and Buffon, and by the greatest physiologists, as Galen and Haller, as the chief character by which man is distinguished from the buttockless simiæ. "Les fesses," says the great historian of nature, "n'appartiennent qu'a l'espèce humaine." The final cause of this prerogative has been assigned by an anatomist: "Solus homo ex omnibus animalibus commode sedet, cui carnosæ et magnæ nates contigere, et pro substernaculo pulvinarique, tomento repleto, inserviunt, ut citra molestiam sedendo, cogitationibus rerum divinarum animum recte applicare possit." Spigel. de Hum. Corp. Fab. p. 9.

The use of the glutei, however, is not confined solely to what the pious Spigelius has imagined, *viz.* the forming a cushion on which the body may be softly supported for the purposes of divine cogitation; but they are very important agents in extending the pelvis on the thighs, and maintaining it in that state in the erect position of the trunk. (See GLUTEUS.) Thus the muscles are particularly connected with the attitude of man; and hence the gluteus maximus, which is the largest muscle of the human body, is so small and insignificant in animals, that it may be almost said not to exist. F. Cuvier says of the ourang-outang "les fesses etoient presque nulles, ainsi que les mollets." Annales du Museum, t. 16. p. 47.

Direction of the Vagina.—The peculiar curvature of the human sacrum and os coccygis gives rise to the particular direction of the organs of generation, and especially of the vagina. That canal, which in the other female mammalia nearly follows the axis of the pelvis, is placed almost at right angles to that axis in the woman: hence parturition is more difficult; but many inconveniences, to which she would have been otherwise exposed, particularly during pregnancy, are obviated.

From this direction of the vagina we explain why the human female is not, like that of brutes, retromingent: and there is this further difference, that the orifice of the urethra in brutes, instead of being placed as in woman, within the labia pudendi, opens into the vagina itself: such at least is the case, according to Blumenbach, in the papio maimon, and simia cynomolgus.

The same circumstance concerning the direction of the vagina will enable us to determine the question agitated from the time of Lucretius, about the most natural posture for the act of copulation, "et quibus ipsa modis tractetur blanda voluptas."—"Quanquam enim," says Blumenbach, "non uno tantum modo sacra hæc celebrare possit homo, eademque cultus varietas a Latinobarbaris ad ea relata sit, quibus ipse a brutis differat, imo et physicæ causæ quandoque intercedere possint, quæ eundem 'more ferarum, quadrupedumque magis ritu' concumbere suadeant; in universum tamen vaginæ ad virilem hastam relatio obversæ veneri magis adaptata videtur." The opinion referred to in this passage by Blumenbach is in the commentaries of Berenger of Carpi, on the anatomy of Mundinus, p. 13. "Homo inter cætera animalia coit per diversos situs, dando amplexus et oscula, et detestandus est in hoc, quia est magis vitiosum ac voluptuosum et diabolicum, quam rationale."

"Monkies always copulate backwards: this is performed sometimes when the female is standing on all fours; and at other times the male brings her between his thighs when he is sitting, holding her with his fore-paws." Hunter on the Animal Economy, p. 136.

That we may finish at once what we have to observe concerning these organs of the female, we add a few remarks on the hymen, &c. It has been generally asserted that this membrane is found nowhere but in the human subject: but there are doubts on this point. (See GENERATION.) Blumenbach examined many animals of the genus simia, and a female elephant, without finding either hymen, or any thing like carunculæ myrtiformes. It is a very singular part of the

the female frame, and one for which no rational ufe has been hitherto affigned. See GENERATION.

The nymphæ and clitoris, which have been fuppofed, like the hymen, to be peculiar to the human fubject, are certainly found in many animals.

Man is a two-handed Animal.—From the erect attitude of man arifes another very diftinguifhing prerogative ; *viz.* the moft free ufe of his two very perfect hands. So greatly does he excel other animals in the conformation of thefe parts, that Anaxagoras was hence induced to make an obfervation, which Helvetius has again brought forwards in our time, " that man is the wifeft of animals, becaufe he poffeffes hands." This indeed is too much, yet Ariftotle is well juftified in obferving that man alone poffeffes hands really deferving that name. Several genera of the mammalia poffefs hands ; but they are much lefs complete, and confequently lefs ufeful than that of the human fubject, which well deferves the name given to it by the Stagyrite, of the organ of all organs. The great fuperiority of that moft perfect inftrument, the human hand, arifes from the fize and ftrength of the thumb, which can be brought into a ftate of oppofition to the fingers, and is hence of the greateft ufe in enabling us to grafp fpherical bodies, and take up any object in the hand, in giving a firm hold on whatever we feize, in executing all the mechanical proceffes of the arts, in fhort, in a thoufand offices, which occur every moment of our lives, and which either could not be accomplifhed at all, if the thumb were abfent, or would require the concurrence of both hands, inftead of being done by one only. All the fimiæ poffefs hands : but the moft diftinguifhing part, namely the thumb, is flender, fhort, and weak, even in the moft anthropo-morphous : regarded as an imitation of the human ftructure, it would almoft warrant the term employed by Euftachius, ridiculous : and the other fingers are elongated and flender. The thumb reached to the firft articulation of the index in the ourang-outang defcribed by F. Cuvier, Annales du Mufeum. t. 16. p. 47.

Monkies are four-handed.—The monkies, apes, and other anthropo-morphous animals can, in fact, be called neither bipeds nor quadrupeds ; but they are quadrumanous, or four-handed. Their pofterior limbs are furnifhed with a thumb, inftead of a great toe ; which latter part belongs only to man, and arifes from the manner in which his body is fupported in the erect pofition.

By a thumb we mean a member, not placed in a parallel direction to the other fingers, but ftanding off from them laterally, enjoying a free power of feparate motion, and, therefore, capable of being brought into oppofition to the other fingers, fo as to give to the member the power of grafping or prehenfion. A great toe, in its direction, articulations, and extent of motion, correfponds entirely to the other toes ; whereas, the joints and mufcles muft be altogether different in the thumb. It is hardly neceffary to point out how entirely unfit the human feet are for all purpofes of prehenfion : but the hind limbs of the fimiæ really deferve the name of hands more than the front ; and are more advantageoufly conftructed for holding. There is, too, a kind of monkey (fimia panifcus, Linn. Coaita, Buff.) without any thumb to the fore limb ; but no fpecies has been difcovered without the thumbs on the hind-limbs.

Hence the difpute concerning the mode of progreffion of the ourang-outang and other fimiæ ; *viz.* whether they go on all-fours, or are fupported by the pofterior limbs only, will be eafily fettled. Neither of thefe reprefentations is correct. Since the hands of thefe animals are not formed for walking, but for feizing and holding objects, it is clear that nature has defigned them to live chiefly in trees. They climb thefe, and feek their food in them ; and one pair of hands is employed in fixing and fupporting the body, while the other gathers their food, or ferves for other offices. Hence fome, who have lefs perfect hands, are furnifhed with prehenfile tails, by which they can be more fecurely fupported in trees.

It is hardly neceffary to add, that when we fee monkies walking erect, it is to be afcribed to inftruction and difcipline. The delineations of the ourang-outang, taken accurately from the life, fhew how inconvenient and unnatural the erect pofture is to thefe animals : they are drawn with the front hands leaning on a ftick, while the pofterior ones are gathered up into the appearance of a fift. No inftance has ever been produced of a monkey, nor of any other animal, except man, which could preferve his body in a ftate of equilibrium, when ftanding on one foot only. All thefe confiderations render it very clear, that the erect ftature not only arifes out of the ftructure and conformation of the human body, but alfo that it is peculiar to man : and that the differences in the form and arrangements of parts, derived from this fource only, are abundantly fufficient to diftinguifh man by a wide interval from other animals.

Monkies not conftructed for the erect Attitude.—The circumftances in the ftructure of the monkey kind, which render them unfuited for the erect attitude, have been already in part explained : *viz.* the narrownefs of the pelvis, fhort and weak lower limbs, fmall fize of the mufcles compofing the buttocks and calves, and flight prominence of the os calcis, which does not come to the ground. We may add, that the exterior margin of the foot chiefly refts on the ground in the fimiæ, which circumftance, while it leaves them a freer ufe of their thumb and long toes in feizing the branches of trees, &c. renders the organ fo much the lefs adapted to fupport the body on level ground. The plantaris mufcle, inftead of terminating in the os calcis, expands into the plantar fafcia, in animals of the monkey kind ; and in other quadrupeds it holds the place of the flexor perforatus digitorum pedis, paffing over the os calcis in fuch a direction, that its tendon would be compreffed, and its action impeded if the heel refted on the ground.

It is rather fingular, fince perfons have been found to contend that man ought to go on all-fours, that there fhould have been others, who undertake to prove, that the ourang-outang, and the monkey tribe in general, have an organization fuited to biped progreffion. Buffon even ftates, that one which he faw always went on two feet, and he afcribes the erect attitude to him without any hefitation. We do not doubt that he can fuftain this pofture for fome time, and when in the unnatural condition of confinement, he may frequently fit : hence, perhaps, we may account for the numerous obfervations in which he is faid to go erect. But the circumftances of ftructure already explained, fhew moft clearly that he is not calculated, like man, for that attitude ; and we find, in fome of the moft authentic accounts, that he is faid to go on all-fours. Allamand, who faw one (fimia fatyrus) in Holland, gives us the following account of its motions and attitudes. " Its ufual attitude was fitting, with its thighs and knees raifed ; it walked nearly in the fame pofture, its rump being very near the ground. I never faw it perfectly upright, except when it wifhed to reach fomething ; and even then its knees were always a little on the bend, and it tottered." (Buffon, by Wood, vol. x. p. 79.) Vofmaer, who has defcribed the fame individual, fays, " This animal generally walked on all-fours, like the other monkies, but it could, likewife, walk erect on its hind feet, and, provided with a ftick, it would often fupport

port itself for a considerable time. However, it never rested its feet flat on the ground, as a man would do, but bent backwards in such a manner, that it supported itself on the external edge of its hind feet, with the toes drawn inwards, which denotes a posture for climbing trees." (Ibid. p. 84.) The testimony of Camper, concerning one which lived for some time at the menagerie of the stadtholder at Petit Loo, is to the same effect: "L'orang vivant couroit a quatre pattes, et lorsqu'il se tenoit debout (ce qu'il fit le plus, dans les premeirs tems de son arriveé et lorsqu'il jouissoit encore de toute sa vigueur) il tenoit les genoux ployés." (Œuvres, tom. i. p. 60.) The bent knees, and general attitude of the figure represented by Tyson, shew clearly that the animal was not designed for a biped: "Being weak," says the author, "the better to support him, I have given him a stick in his right hand." (P. 16.) Several passages shew that this animal often went on all-fours, and thus concur with the representation given in the report of the directors of the Sierra Leone company, p. 164: in describing a young one, they say, "at first he crawled on all-fours, always walking on the outside of his hands; but when grown larger, he endeavoured to go erect, supporting himself by a stick, which he carried in his hand." The description of the individual observed by F. Cuvier, corroborates these observations: he climbed excellently, but walked as imperfectly. In the latter operation, he rested his closed hands on the ground, and dragged forward his hind parts. If one hand was held, he could walk on his feet; but then he supported himself partly by resting the other hand on the ground. The outer edge of the foot alone touched the ground, and the toes were bent. Annales du Museum, vol. xvi. p. 49.

That the gibbon (simia longimana), another of the anthropo-morphous simiæ, is not suited for the erect attitude, appears from the testimony of Daubenton. It could carry itself almost erect on its feet, but the legs and thighs were rather bent, and sometimes the hand touched the ground to support the reeling body; it was unsteady whenever it stopped while in an upright posture; it rested on the heel only, and raised the sole of the foot; it remained but a short time in this attitude, which appeared unnatural. (Buffon, by Wood, vol. x. p. 80.) We must, therefore, set down as incorrect the following assertion of Linnæus: "Dari simias erecto corpore binis æque ac homo pedibus incedentes, et pedum et manuum ministerio humanam referentes speciem."

The relative size of the cranium and face, the nearly vertical direction of a line drawn in front of the forehead and face, and the position and direction of the great occipital foramen and condyles, are points in which man differs from all animals. See CRANIUM.

Teeth.—The teeth of man are distinguished by the circumstance of their being arranged in an uniform, unbroken series: there are intervals, and some teeth project beyond the others in all animals. The canine teeth are longer than the others in monkies; in some genera very considerably so; and there are intervals in each jaw to receive the teeth of the other. The lower incisors are placed perpendicularly, which is a principal characteristic of the human frame: the cuspidati neither project beyond the neighbouring teeth, nor are separated from them by any interval. The molares are clearly distinguished by their obtuse prominences from those of all the simiæ. The lower jaw is remarkable for three circumstances; *viz* its shortness, the prominence of the chin, which corresponds to the perpendicularity of the incisor teeth, and the form, direction, and articulation of the condyles. The lower incisors of man and the front of his jaw are placed in the same vertical line: in animals the former slant very considerably backwards, the jaw slopes backwards directly from the alveoli, and there is consequently no chin.

Smoothness of the Skin.—Passing over some circumstances of less consequence, ordinarily enumerated among the distinctive characters of man, as the lobules of the ear, the tumid lips, particularly the inferior one, &c. we have a few remarks to make on the smoothness of the human integuments. "Dantur," says Linnæus, "alicubi terrarum simiæ minus quam homo pilosæ:" but he does not tell us in what part of the world they are to be found. The unanimous reports of all travellers, as well as the specimens of such animals exhibited in Europe, prove incontestibly that the man-like simiæ, called ourang-outangs, whether the species from Angola, or that from Borneo, as well as the long-armed monkey or gibbon, are naturally much more hairy than the human subject. Although the individuals brought into these countries have been under the adult age, and generally very sickly, their body has been in all cases universally hairy. We have, indeed, some accounts of people, particularly in the islands of the South sea, remarkable for their hairiness: but they are not completely satisfactory. Spangberg relates, that he found such a race in one of the Southern Kurile islands (lat. 43 50'), on his return from Japan to Kamtschatka. (Müller Sammlung Russischer Geschichte, tom. iii. p. 174.) And J. R. Forster observed individual instances in the islands of Tanna, Mallicollo, and New Caledonia. (Observations on a Voyage round the World.) Such a race is said to be found in the interior of Sumatra. Marsden, History of Sumatra, p. 35, note.

While man is remarkable for the smoothness of his skin on the whole, some parts of his body are even more hairy than they are in animals, as, for example, the pubes and axilla, which the ancients consequently regarded as peculiar characters of man.

Comparative Proportions of the Body in Man and the Ourang-outangs.—To this division we shall subjoin a short statement of the comparative size of parts in the human subject and in the ourang-outangs: it is an important point in illustrating the specific differences of the two animals, and cannot be so conveniently introduced in any other part.

The difference of stature is remarkable: none of those hitherto brought into Europe has been more than three feet high, and most have been under that size. Of eight seen by Camper, none exceeded $2\frac{1}{2}$ feet (Rhynland measure): (Œuvres, vol. i. p. 51.) From observing the state of the teeth, and progress of ossification, and estimating, according to the human subject, the additions which the stature might be expected to receive, he thinks that their adult height may be set down at 4 feet (Rhynland measure); and F. Cuvier makes it considerably less. (Annales du Museum, vol. xvi. p. 51.) Yet travellers speak of them as 5 and 6 feet high, and even more: what they say of their erect gait, of their violating women, &c. &c. is probably of equal accuracy.

Tyson's chimpansee (simia troglodytes) was 26 inches from the top of the head to the heel: the arm, from the shoulder to the end of the fingers, 17 inches: the hand, $5\frac{1}{2}$ inches: the middle finger $2\frac{1}{2}$ inches. From the head of the thigh-bone to the heel, 12 inches: from the heel to the end of the middle toe, which was the longest, $5\frac{3}{4}$ inches. femur, 7: Tyson's Anatomy of a Pigmy, p. 15.

In the true ourang-outang (S. satyrus), according to Camper, the whole length was less than 32 inches: the arm, $8\frac{1}{2}$: the fore-arm, 9: the hand, 7: the fingers, 3: the femur, 7: the tibia, 7: the foot, $7\frac{1}{2}$: the toes, $2\frac{3}{4}$.

In the ourang-outang described by F. Cuvier, the height was

was between 26 and 30 inches: the arm, from the axilla to the end of the fingers, meafured 18: and the lower extremity, from the top of the thigh to the tarfus, 8 or 9. Annales du Mufeum, vol. xvi. p. 46.

The important differences will be perceived by comparing thefe meafures with the proportions of the human frame, as given in a former part of this article: we juft place, in parallel lines, two or three of the moft ftriking.

	In Man.	Ourang-outang.
Length of the whole body -	8 heads.	6 heads.
Length, from the end of one middle finger to that of other, when the arms are extended -	8 ——	8 ——
Length of the hand -	$\frac{4}{5}$ ——	$1\frac{1}{5}$ ——
Length of the foot -	$1\frac{1}{3}$ ——	$1\frac{1}{5}$ ——

In the following table we have placed together the dimenfions of fome parts of a male fkeleton; of the fimia fatyrus (ourang-outang, Camper); and of the fimia troglodytes, (chimpanfee, Tyfon.)

	Man.	S. Satyrus. (Camper.)	S. Troglodytes. (Tyfon.)
	Inches.	Inches.	Inches.
The whole body	71	uncertain, but lefs than } 30	26
Upper extremity	32	*$24\frac{1}{2}$	17
Lower extremity	39	16	12
Hand - -	$8\frac{1}{4}$	7	$5\frac{1}{2}$
Thumb - -	$4\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{1}{4}$
Middle finger -	$4\frac{1}{4}$	3	$2\frac{1}{2}$
Femur - -	20	7	
Tibia - -	$16\frac{3}{4}$	7	
Foot - -	$10\frac{1}{2}$	$7\frac{1}{2}$	$5\frac{3}{4}$
Middle toe -	$2\frac{1}{4}$	$2\frac{3}{4}$	$1\frac{1}{2}$

* This length feems exceffive: Camper's meafures are, arm $8\frac{1}{2}$, fore-arm 9, hand 7. In another, rather fmaller individual, the fame parts meafured refpectively, $6\frac{1}{2}$, 6, and $5\frac{1}{2}$ inches. Œuvres, vol. i. p. 49.

The comparative lengths of the upper arm and fore-arm, exhibit alfo a ftriking difference in man and the monkey kind. In a male fkeleton meafuring 5 feet 8 inches, the os humeri was 13, and the ulna $9\frac{7}{8}$; in a living man of 5 feet $9\frac{1}{2}$ inches, thefe bones were refpectively 14 and 11. In Tyfon's chimpanfee of 26 inches, the humerus was little more than 5, the ulna 5, and the radius $5\frac{1}{2}$: in a monkey of 2 feet 2 inches, the humerus was $4\frac{1}{4}$, the ulna 5.

Other Diftinctions.—We may obferve further, with refpect to the comparifon of man and the ourang-outangs, that one fpecies of the latter (fatyrus) has no nail on the thumb of the hind hand; and the other (troglodytes), according to Tyfon, has 13 ribs. Both of them have a facrum compofed of three pieces only, inftead of five, as in the human fubject; and one at leaft (fatyrus) has a large membranous pouch communicating with the larynx. The ourang-outang has no ligamentum teres (Camper, l. c. p. 132.); it has a membranous canal running along the fpermatic chord from the abdomen to the tunica vaginalis, as other monkies and quadrupeds have (ibid. p. 109.); but this does not exift in the chimpanfee. (Tyfon, p. 82.) We venture to affert that thefe differences only, without any others, would be fufficient to eftablifh the diftinction of fpecies: that no example can be adduced of animal ftructure deviating from its original model in this way; and confequently that the difference can be accounted for only by referring the animals to fpecies originally diftinct.

II. *Diftinctions of Internal Structure.*

1. Parts that man alone, or with a few other mammalia does not poffefs. Moft of thefe, which are found chiefly in the domefticated kinds, were formerly attributed to man, when human diffections were rare, from the want of opportunity, or greater attachment to zootomy.

The *Panniculus carnofus*, or fubcutaneous ftratum of fibres, defcribed by Galen and his followers, even by Vefalius, the great reftorer of anatomy, and expofer of Galen's errors, as a part of the human body, does not exift in man, nor, according to Tyfon, in the chimpanfee. It is found in the monkies.

The *rete mirabile* of the head, the feventh or fufpenforius mufcle of the eye, the membrana allantois, and ligamentum nuchæ, are parts not found in the human fubject.

The foramen incifivum is common to man with animals; but it is fmall and fingle: moft other mammalia have it double and large.

On the fubject of the intermaxillary bone, fee the comparifon of the human head with that of animals, in the article CRANIUM; and the article MAMMALIA, in *Comparative Anatomy*.

2. *Differences between Man and Animals, in certain internal Parts: the Brain.*—Paffing over in filence fome lefs important points, as, for inftance, that the human cryftalline is proportionally fmaller than that of any animals, excepting the cetacea, and lefs convex in the adult, that the foramen occipitale is placed further forwards in the head (fee CRANIUM), &c. we find in the brain a very ftriking difference between man and other animals. He has the largeft brain, not, according to the opinion which has been generally received fince the time of Ariftotle, in proportion to the reft of the body, but to the fize of the nerves, which proceed from it. Hence, if we divide the nervous fyftem into two parts, one confifting of the nerves, and that part of the brain, from which they arife, which is to be confidered as appropriated to the functions of a merely animal life; the other, comprehending the remainder of the brain, and connecting the functions of the nerves with the faculties of the mind, man will poffefs the greateft proportion of the latter more important part. See Soemmerring Diff. de Bafi Encephali, p. 17. I. G. Ebel Obf. Neurologicæ ex Anatome comparata Franc. of. ad Viadr. 1788. Soemmerring von der körperlichen Verfchiedenheit des Mohren vom Europäer, 1785.

From the latter work of Soemmerring, to whom we owe the difcovery of this very interefting circumftance, we extract his own account of the matter. "The careful and accurate comparifon of the brains of animals of various orders, for which my opportunities have been very confiderable, conducted me at laft to the following pofition, firft difcovered by myfelf: 'that man poffeffes with the largeft brain the fmalleft nerves;' or, that the affertion that man has the largeft brain will hold good only in comparing that organ to its nerves. That acute phyfiologift Monro feems to be the firft who adopted and confirmed this opinion. (On the Nervous Syftem, Edinb. fol. chap. 8.) It was formerly conjectured, indeed affumed, that man has the largeft brain; but how was this proved? by weighing the brain and the body in man, and in the moft common domeftic animals: thus far obfervation confirmed it. But thofe phyfiologifts who carried their inveftigations further, were confiderably perplexed at finding that birds exceed man in the proportion which their brain bears to the reft of the body, and that the dolphin, feals, and the fmaller mammalia, as the moufe, fquirrel, &c. have, in proportion to their fmall bodies, (but

certainly

certainly not in proportion to their head and organs of ſenſe, or to that part which the face forms, compared with the cranium) a very large brain.

"It is a very looſe mode of proceeding to compare the body, of which the weight varies ſo conſiderably according to fatigue, illneſs, emaciation, or embonpoint, with the brain, which is affected by none of theſe circumſtances, and ſeems to remain conſtantly the ſame ; an eaſier and much leſs deceptive compariſon is that of the brain to its own nerves.

"I do not conceive that the nerves are related to this organ, as excretory ducts are to a gland ; but I think it probable that a very ſmall proportion of its maſs is ſufficient for their connection, ſo far as mere animal exiſtence is concerned. Conſequently, the being which poſſeſſes the greateſt quantity of brain over and above this portion, will probably poſſeſs the greateſt intellectual capacity. Man, who holds only a middle rank in reſpect to his bodily properties, is raiſed in this point of view far above other animals ; he is the firſt of beings. All the ſimiæ (for I have been fortunate enough to procure ſpecimens of the four principal diviſions) come after him ; for, although the proportion of their brain to the body, particularly in the ſmall ſpecies with prehenſile tails, is equal to that of man, their very large eyes, ears, tongue, and jaws, require a much larger maſs of brain than the corresponding parts in the human ſubject ; and if you remove this, the ratio of the brain to the body is much diminiſhed.

"Animals of various kinds ſeem to me to poſſeſs a larger or ſmaller quantity of this ſuperabundant portion of brain, according to the degree of their ſagacity and docility.

"The largeſt brain of a horſe, which I poſſeſs, weighs one pound ſeven ounces ; the ſmalleſt human brain that I have met with in an adult, two pounds five ounces and a quarter. But the nerves on the baſis of the horſe's brain are ten times larger than in the other inſtance, although it weighs leſs by fourteen ounces and a quarter.

"But we are not haſtily to conclude that the human ſpecies have ſmaller nerves than any other animal. In order that my ideas may be better underſtood, I ſhall ſtate the following imaginary caſe. Suppoſe the ball of the eye to require 600 nervous fibrils in one inſtance, and 300 in another, though only half the ſize of the former ; further, that the animal with 600 fibrils poſſeſſes a brain of ſeven, and that with 300 a brain of only five drams ; to the latter we ought to aſcribe the larger brain, and a more ample capacity of regiſtering the impreſſions made on the organ of viſion ; for, allowing one dram of encephalon to 100 fibrils, the brain which is abſolutely the leaſt will have a ſuperfluous quantity of two drams, while the larger has only one. That the eye, which is ſupplied with a double quantity of fibrils, may be a more complete organ of ſenſe, will be readily admitted ; but the remark is inapplicable to the ſubject in diſpute." P. 59—67.

The brain of the monkey is eaſily diſtinguiſhed from that of man, independently of its ſize and weight ; Soemmerring found no leſs than fifteen viſible material anatomical differences between the human brain and that of the common ape. Ibid. p. 77.

Soemmerring has alſo ſhewn that the earthy matter of the pineal gland does not exiſt in any animal beſides man. He found it once in the brain of a deer, and Caldani informed Blumenbach that it did not exiſt in an old man, whom he diſſected. De Gen. Hum. Variet. p. 44.

Other Parts.—The ſituation of the heart, which reſts, not on the ſternum, as in quadrupeds, but, according to the erect attitude of man, on the diaphragm, is peculiar. Its baſis does not look towards the head, as in the former, but towards the dorſal vertebræ ; while the apex is turned to the left breaſt. There are very few mammalia, beſides man, which have the pericardium fixed to the diaphragm.

The appendix vermiformis cæci belongs to the chimpanſee and ourang-outang, the gibbon according to Daubenton, the phaſcoloma of New Holland, and man.

In addition to what we have ſaid about female organs, the parenchyma of the uterus is unlike that of any animal ; the texture of the placenta, the length of the chord, and the ſingle umbilical vein are peculiar to man. The veſicula umbilicalis, found in all human conceptions before the fourth month, has been obſerved in no other animal.

3. *Functions of the animal Economy. Pliancy of the human Frame.*—The moſt important prerogative under this head, according to Blumenbach, is the ſoftneſs and pliancy (teneritudo et obſequioſa mollities) of the cellular ſubſtance. Zinn obſerved that this tiſſue is more fine and tender in man than in any animal. To this circumſtance Blumenbach aſcribes the ſingular power of adaptation to every climate on the globe. "Uti ergo natura hominem reſpectu victus omnivorum fecit ; ita reſpectu habitationis eum omnis ſoli et climatis (παντοδαπον) eſſe voluit ; ideoque corpus ejus ex maxime obſequioſo contextu mucoſo fabricatum eſt, ut eo facilius ad multifarios diverſorum climatum impulſus ſe aptare et accommodare poſſit." De Gen. Hum. Variet. Nat. p. 48.

If we adopt this view, it will afford an anſwer to a queſtion ſtated in the outſet, whether the exiſtence of men in ſuch various climates can be aſcribed to phyſical conſtruction or reaſon ? In what way do the Greenlander, the Eſkimau, and the Canadian employ remarkable talents or invention to protect themſelves againſt the cold ? they brave the winter with open breaſt and uncovered limbs, and devour their whales and ſeals dreſt, raw, or putrid. The negro is healthy and ſtrong under a vertical ſun, with the ſoles of his feet bare on the burning ſands. The fox, the beaver, the marmot, and the hamſter, dig dwellings for themſelves : where then is the prerogative of man ? The mind indeed employs the excellent ſtructure of the body, lifts man above the reſt of the creation, accommodates him to all places, gives him iron, fire, and arms, furs, and ſcreens from the ſun, &c. but with all this could never make him what he now is, the inhabitant of all climates, if he did not poſſeſs the moſt enduring and flexible body. The lower animals have no defence againſt the evils of a new climate, but the force of nature. The arts of human ingenuity furniſh a defence to man againſt the dangers that ſurround him in every region. Accordingly we ſee the ſame nation paſs into all the climates of the earth ; reſide whole winters at the pole ; plant colonies beneath the equator ; purſue their commerce, and eſtabliſh their factories in Africa, Aſia, and America. They can equally live under a burning and a frozen ſky, and inhabit regions, where the hardieſt animals cannot exiſt. Such great changes indeed ought not to be hazarded ſuddenly, and without precaution. The greateſt evils that have ariſen from change of climate, have been occaſioned by the preſumption of health that refuſes to uſe the neceſſary precautions, or the neglect of ignorance that knows not what precautions to uſe. But when changes are gradually and prudently effected, habit ſoon accommodates the conſtitution to a new ſituation, and human ingenuity diſcovers the means of guarding againſt the dangers of every ſeaſon, and of every climate. The ſuperiority of man appears more ſtriking, when we compare him to the animals which moſt reſemble him in form and properties. The moſt anthropo-morphous ſimiæ inhabit only a few ſmall ſouthern diſtricts and iſlands of the old world ; are ſubject to numerous diſeaſes, loſe all their vivacity, ſtrength, and natural character, and periſh after

lingering

lingering in a miserable way, when removed from their native abodes. An ourang-outang brought to Paris, never recovered the expofure to cold in croffing the Pyrenées, and died at the age of fifteen months, with moft of the vifcera "déforganifé et remplis d'obftructions." (Annales du Mufeum, t. xvi. p. 53.) The monkies in general are confined within very narrow limits; they exift with difficulty in temperate countries, and can propagate only in warm climates. One which was impregnated in this country, and attended with all poffible care, brought forth a young one, which died immediately. (Hunter on the Animal Economy, p. 137.) Probably the fpecies could not be continued here, with all the aid of art; and it certainly could not be effected, if the animals were wild. When they are introduced into the north (indeed into the greater part) of Europe, and very carefully managed in their food, temperature, &c. they die very quickly, and, in almoft all cafes of difeafed vifcera, particularly the lungs.

Slow Developement.—Other circumftances in the economy correfpond with this power of adaptation; fuch are, the flow growth, long infancy, and late puberty of man. In no animal but man do the futures of the cranium clofe, or the teeth come out at fo late a period; none is fo long before it can fupport the body on the legs, before it arrives at the complete adult ftature, and capacity for exercifing the fexual functions. If we add to thefe circumftances, that man is not provided by nature with means of defence, and, confequently, requires affiftance; and that his great diftinctions, reafon, and fpeech, are only germs, which are not developed of themfelves, but are brought to maturity by extraneous affiftance, cultivation, and education, we fhall infer that he is defigned, by nature, for focial union. Such a condition appears more confonant to the ftructure, properties, and functions of our frame, even if it were not fupported by the concurring voice of actual experience in all ages and nations, than the imaginary and moft abfurdly named "ftate of nature," of fome philofophers. Rouffeau, the great apoftle of this doctrine, informs us, in direct words, that the ftate of nature never has exifted; and he fets afide all facts as foreign to the queftion. With thefe admiffions before us, we are required to believe that we have degenerated from our natural ftate; that fpeech, fociety, arts, inventions, fciences, agriculture, commerce, property, civil government, and inequality of conditions, have introduced all poffible mifery, and have debilitated our phyfical being; that we fhould live in the woods fcattered and folitary to get food enough, protect life by flight and force, fatisfy our defires and fleep. Buffon has reafoned fo well on this fubject, that we employ his words. "In this condition of nature, the firft education requires an equal time as in the civilized ftate; for, in both, the infant is equally feeble, and equally flow in its growth; and, confequently, demands the care of its parents during an equal period. In a word, if abandoned before the age of three years, it would infallibly perifh. Now, this neceffary and long-continued intercourfe between mother and child is fufficient to communicate to it all that fhe poffeffes: and though we fhould falfely fuppofe that a mother, in a ftate of nature, poffeffes nothing, not even the faculty of fpeech, would not this long intercourfe with her infant produce a language? Hence a ftate of pure nature, in which man is fuppofed neither to think nor fpeak, is imaginary, and never had an exiftence. This neceffity of a long intercourfe between parents and children produces fociety in the midft of a defart. The family underftand each other both by figns and founds; and this firft ray of intelligence, when cherifhed, cultivated, and communicated, unfolds, in procefs of time, all the germs of cogitation. As this habitual intercourfe could not fubfift fo long, without producing mutual figns and founds, thefe, always repeated and gradually engraven on the memory of the child, would become permanent expreffions. The catalogue of words, though fhort, forms a language, which will foon extend as the family augments, and will always follow, in its improvement, the progrefs of fociety. As foon as fociety begins to be formed, the education of the infant is no longer individual, fince the parents communicate to it, not only what they derive from nature, but likewife what they have received from their progenitors, and from the fociety to which they belong. It is no longer a communication between detached individuals, which, as in the animals, would be limited to the tranfmiffion of fimple faculties, but are inftitutions of which the whole fpecies participates, and whofe produce conftitutes the bafis and bond of fociety." Buffon, by Wood, vol. x. p. 30.

Some other Characters.—No other of the clafs mammalia enjoys fo long a life as man in proportion to his fize. As the duration of life is in proportion to the time fpent in arriving at the full growth, there is every reafon to fuppofe that the monkies will fall very far fhort of man in this refpect: in this climate they are cut off fo quickly, that we cannot form a judgment.

The celebration of the rites of Venus is not confined to any particular feafon of the year; although the author of a work "de Amore," dedicated to Joanna of Arragon, fo highly celebrated for her perfonal charms, enquires why "æftate puellæ fint libidinofiores & amantiores; viri autem contra hyeme."

Nocturnal difcharges of the feminal fluid are peculiar to man. See Generation, in the phyfiology of the male organs.

Menfes.—The menftrual difcharge is peculiar to women, and belongs to the whole fex in all countries: fo that Pliny is right in regarding woman as the only "animal menftruale." "I know indeed," fays Blumenbach, "that the fame difcharge has been afcribed to other animals, particularly of the order quadrumana. I have carefully enquired about all the female monkies, which I have feen for thefe twenty years, either in menageries or carried about for public exhibition, and have found fome of them liable to uterine hæmorrhage, which obferved no period, and was regarded by the more intelligent keepers as a circumftance arifing from difeafe, although they acknowledged, that in order to excite the admiration of the fpectators, they often reprefented it as true menftruation." De Gen. Hum. Var. note, p. 51.

4. *Faculties of the Mind: Reafon.*—All philofophers refer with one accord to the enjoyment of reafon, as the chief and moft important prerogative of the human fpecies. If we enquire, however, more particularly into the meaning of this word, we fhall be furprized to find what various fenfes different individuals affix to the fame expreffion, or, as Blumenbach obferves, "quam longe diverfiffimas de rationis notione reddunt rationes philofophi maxime rationales." According to fome, reafon is a peculiar faculty of the mind, belonging exclufively to man: others confider it as a more enlarged and complete developement of a power, which exifts, in a lefs degree, in other animals: fome defcribe it as a combination of all the higher faculties of the mind; while others affert that it is only a peculiar direction of the powers of the human mind, &c. "Non noftrum inter hos tantas componere lites."

The fubject may perhaps be more fhortly and fafely difpatched by confidering it a pofteriori. In the enumeration of natural exiftences we are obliged to rank man in the clafs

clafs of animals: but the analogies on which we do this are external, and authorize us not to pronounce that the nature of man is fimilar to that of the brute. In order to acquire a diftinct idea concerning the nature of each, it is neceffary that we fhould have as complete a knowledge of the internal qualities of animals, as we have of our own. But, as it is impoffible to know what paffes within them, or how to rank and eftimate their fenfations, in relation to thofe of man, we can only judge by comparing the effects which refult from the natural operations of both.

Let us, therefore, confider thefe effects; and, while we acknowledge all the particular refemblances, we fhall only examine fome of the moft general diftinctions. The moft ftupid man is able to manage the moft alert and fagacious animal: he governs it, and makes it fubfervient to his purpofes. This he effects not fo much by ftrength or addrefs, as by the fuperiority of his nature. He compels the animal to obey him, by his being poffeffed of reafon, which enables him to project and to act in a fyftematic manner. "Quifquis es, iniquus æftimator fortis humanæ, cogita quanta nobis tribuerit parens nofter, quanto valentiora animalia fub jugum miferrimus, quanto velociora affequamur, quam nihil fit mortale non fub ictu noftro pofitum." Seneca. The ftrongeft and moft fagacious animals have not the capacity of commanding the inferior tribes, or of reducing them to a ftate of fervitude. The ftronger, indeed, devour the weaker: but this action implies an urgent neceffity only, and a voracious appetite, qualities very different from that which produces a train of actions all directed to one common defign. If animals be endowed with this faculty, why do not fome of them affume the reins of government over others, and force them to furnifh their food, to watch over them, and to relieve the fick or wounded? But, among animals there is no mark of fubordination, nor the leaft trace of any of them being able to recognize or feel a fuperiority in his nature above that of other fpecies. We fhould therefore conclude, that all animals are of the fame nature, and that the nature of man is not only far fuperior, but likewife of a very different kind from that of the brute.

Man ufes all kinds of food, and inhabits every climate of the globe. The unlimited power, which he poffeffes in thefe refpects, gives rife to various wants, from the infinite variety of climate, soil, and other circumftances.

Pater ipfe colendi
Haud facilem effe viam voluit, primufque per artem
Movit agros, curis acuens mortalia corda.

Man receives, therefore, from his creator the power of invention and reafon, which fupply his wants. Hence, in the moft ancient times, and by the wifeft nations, the genius of invention has been honoured with divine worfhip: it forms the Thoth of the Egyptians, the Hermes of the Greeks. Thus, to give a few inftances, man has made tools for affifting his labour; and hence Franklin fagacioufly defined him a "tool-making animal:" he has formed arms and weapons; he has devifed various means of procuring fire. Laftly, "the moft noble and profitable invention of all others was that of fpeech, whereby men declare their thoughts one to another for mutual utility and converfation; without which, there had been amongft men neither commonwealth, nor fociety, no more than amongft lions, bears, and wolves." (Hobbes' Leviathan.) This is a moft important characteriftic of man, fince it is not born with him, like the voices of animals, but has been framed and brought into ufe by himfelf, as the arbitrary variety of different languages inconteftibly proves; or, as fome conceive, with extraordinary affiftance. See LANGUAGE.

Man exhibits, by external figns, what paffes within him: he communicates his fentiments by words; and this fign is univerfal. The favage and the civilized man have the fame powers of utterance; both fpeak naturally, and are equally underftood. It is not owing, as fome have imagined, to any defect in their organs, that animals are denied the faculty of fpeech. The tongue of a monkey is as perfect as that of a man: Camper afferts that the laryngeal pouch renders it impoffible for the ourang-outang to fpeak; we do not underftand how this is afcertained; but, allowing its truth, there are other monkies who have no pouch, and yet cannot fpeak.

There are infinite fubtleties both in the ancient and modern fcholaftics concerning the fpeech of brutes. We cite, as an example, Albertus, furnamed the Great, who allows to a monkey the privilege of fpeech, but with a memorable reftriction: "Pygmæus loquitur quidem, cum tamen fit irrationabile animal, verum non difputat; nec loquitur de univerfalibus rerum, fed potius fuæ voces diriguntur ad res particulares de quibus loquitur."

Several animals may be taught to pronounce words, and even to repeat fentences; which proves clearly that the want of fpeech is not owing to any defect in their organs: but to make them conceive the ideas which thefe words exprefs, is beyond the power of art. They articulate and repeat like an echo or machine.

Language implies a train of thinking; and for this reafon brute animals are incapable of fpeech: for though we fhould allow them to poffefs fomething fimilar to our firft apprehenfions, and to our moft grofs and mechanical fenfations, it is certain that they are unable to form that affociation of ideas in which alone the effence of thought confifts. They can neither think nor fpeak, becaufe they can neither join nor feparate ideas; and, for the fame reafon, they neither invent nor bring any thing to perfection.

With the operations of animals, who always perform the fame work in the very fame manner, the execution of any individual being neither better nor worfe than that of any other, in whom the individual, at the end of fome months, is what he will remain through life, and the fpecies, after a thoufand years, juft what it was in the firft year; contraft the refults of human induftry and invention, and the fruits of that perfectibility, which characterifes both the fpecies and the individual: by the intelligence of man the animals have been fubdued, tamed, and reduced to perpetual flavery. By his labours marfhes have been drained, rivers confined, their cataracts effaced, forefts cleared, and the earth cultivated. By his reflexion, time has been computed, fpace meafured, the celeftial motions recognized and reprefented, the heavens and the earth compared, and the Creator worthily adored. By his art, which is an emanation of fcience, the feas have been traverfed, and mountains overcome; nations have been united; a new world has been difcovered; a thoufand other detached lands have been reduced under his dominion; laftly, the whole face of the earth at prefent exhibits the works of his power, which, though fubordinate to that of nature, often exceeds, at leaft, fo wonderfully feconds her operations, that, by the aid of his hands, her whole extent is unfolded, and fhe has gradually arrived at that point of perfection and magnificence in which we now behold her.

In the point of view which we have juft confidered, man ftands alone; his reafon, and what he has effected by it, place him at a wide interval from all animals; at an interval, which no animal hitherto known to us can fill up. The man-like monkey, the almoft reafonable elephant, the docile dog, the fagacious beaver, the bee have no reafon. In

 none

none of these instances is there any progress either in the individuals or the species. See the article INSTINCT.

Laughter and Weeping.—Whether these are peculiar to man may admit of some doubt; they were not, like speech, invented by him, but seem rather born with him, and are more connected with the passions than with reason. Many animals secrete tears; but the question is, do they weep from grief? The fact has been asserted by some respectable witnesses, as by Steller of the seal, and Pallas of the camel. It is more doubtful whether they manifest mirth by laughter, though this has been asserted. Le Cat says, that he saw the chimpansee both laugh and weep.

5. *Diseases.*—There are many diseases peculiar to man, which may be thought a more fit subject for pathology than natural history; but as these unnatural phenomena arise out of the natural organization and habit of the body, and dispositions of the animal economy, they undoubtedly deserve a place in the discussion.

While the causes of disease in general are so obscure, it is hazardous to set down any particular affections as exclusively belonging to man; they might affect other animals also, if they were exposed to the same causes. Wild animals, we believe, have no diseases; domesticated ones have several; and they are more numerous in proportion as the subjugation is more complete, and the way of life differs more widely from the natural one. The diseases of our more valuable domestic animals, are sufficiently numerous to employ a particular order of men; and the horse alone has a set of surgeons or physicians to his own share. The miserable canary birds seem to be equally in want of professional assistance: among the disorders to which they are exposed, Buffon enumerates inflammation of the bowels, asthma, epilepsy, abscess, shankers on the bill, and scabs. (Vol. xiv. p. 87.) In man, the most artificial of all animals, the most exposed to all the circumstances that can act unfavourably on his frame, diseases are the most numerous, and so abundant and diversified, as to exercise the ingenuity of the nosologist, and fatigue the memory of the physician. Perhaps nosological catalogues afford the most convincing proof, that man has departed from his natural habits, or has deserted that way of life to which nature had destined him; unless, indeed, it should be contended that these afflictions are a part of his nature, a distinction from animals of which he will not be very likely to boast. This, however, we apprehend, will be too much even for the sons of Galen to defend, and it would certainly bring the theologians on their backs, as leading to inferences not very favourable to the benevolence of the Deity. The following sentiments of a most eloquent writer, and great philosopher, deserve attention, although he was no physician. "Have we any solid reason to suppose, that in countries where medicine is most neglected, the life of man is shorter than where this art is the most carefully cultivated? And how should it be so, if the evils we bring on ourselves are more numerous than the remedies which medicine furnishes. The extreme inequality in the mode of living, the excessive labours which consume the bodies and break down the spirits of the poor, the still more dangerous softness, which enfeebles the rich, destroying the one by their wants, and the others by their excess; the ease with which sensuality can be excited and gratified, the too luxurious food of the rich, the monstrous mixtures, the pernicious seasonings which stimulate and overwhelm them with indigestion; the bad and often insufficient nourishment of the poor; the spoiled provisions, the sophisticated drugs; the knavery of those who sell, the errors of those who administer them; the want of rest, the violent passions which agitate and exhaust us, the chagrins and vexations incidental to all conditions; are so many fatal proofs that most of our ills are our own work, and might have been avoided by adhering to the simple, uniform, and solitary life prescribed by nature. If she designed that we should be healthy, I would almost affirm that reflection is a state contrary to nature, and that the man, who meditates, is already a depraved animal. Consider the epidemic diseases engendered among multitudes collected together, the disorders caused by the delicacy in our mode of living, by passing from our heated rooms into the open air, by increasing or lessening our clothing without sufficient precaution, and all the cares converted by our excessive sensuality into necessary habits, and the neglect or privation of which then very frequently costs us our life or health; add to the account the fires and earthquakes, which consume and overturn whole cities, and sweep off the inhabitants by thousands; in short, bring together the dangers, which all these causes constantly suspend over our heads, and you will feel how dearly nature makes us pay for despising her lessons. When we reflect on the healthy constitutions of savages, at least of those whom we have not corrupted by our spirituous liquors, and remember that they know no other ailments than wounds and old age, we are led to suppose, that the history of disease would be easily written by following that of civil societies." Discours sur l'Inegalite, p. 69, and note 8.

The history of the young savage of Aveyron strikingly illustrates several of the foregoing remarks. In his wild state, he bore the cold of the severest winter without any clothing, and could remain, when he was first taken, for several hours together, in the winter, exposed half naked to wind and rain on the wet turf. He refused high-seasoned dishes and strong liquors, even when very hungry, and ate at first only potatoes, acorns, and raw chesnuts. His civilization went on so rapidly and successfully, that in a few months he had had three severe colds, and soon after became subject to epileptic fits. An observation of Humboldt tends to confirm the position, that the individuals, whose bodies are strengthened by healthy habits in respect to food, exercise, &c. are enabled to resist those causes which produce diseases in other men. Humboldt paints to us the Indians of New Spain as a set of peaceful cultivators, accustomed to uniform nourishment, of an almost entirely vegetable nature, that of their maize and cereal gramina: they are subject to no deformity: he never saw a hunch-backed Indian, and it is extremely rare to see any who squint, or are lame in the arm or leg. "In the countries where the inhabitants suffer from the goitre, this affection of the thyroid gland is never observed among the Indians, and seldom among the Mestizos." (Political Essay on the Kingdom of New Spain, book ii. ch. 6.) Similar observations on the freedom from deformity occur in the descriptions of most savages.

This comparison of diseases is difficult, since the nosology of brutes must by its very nature be cultivated under the most serious obstacles. The diseases in the following list, derived from Blumenbach, may be considered, in all probability, as peculiar to man.

Nearly all the exanthemata, at least

*Variolæ**,
Morbilli,
Scarlatina,
Miliares,
Petechiæ,
Pestis.

* A monkey at Amsterdam, contracted a local ulcer from the contagion of small-pox, but had no fever.

 Of

Of the Hæmorrhagies.
Epistaxis,
Hæmorrhoides,
Menorrhagia.
Of nervous affections.
Hypochondriasis,
Hysteria,
Mental affections, properly so called, as *melancholia*, *nostalgia*, &c. probably also *satyriasis* and *nymphomania*,
Cretinismus.
Of the cachexiæ,
Rhachitis,
Scrofula,
Lues Venerea,
Pellagra,
Lepra and *Elephantiasis.*
Of the Locales.
Amenorrhæa,
Cancer,
Clavus,
Hernia congenita?
The various kinds of *prolapsus*, particularly that congenital one of the urinary bladder.
Herpes,
Tinea capitis.

6. In the preceding remarks, we have adverted to some of the points, in which man has been erroneously supposed to differ from animals: a few only remain. The approximation of the two eyes is not peculiar; they are much nearer to each other in the simiæ.

Many other mammalia, particularly among the quadrumana, have eye-lashes in both eye-lids: this is the case in the elephant.

The long-nosed monkey (simia rostrata or nasalis) exceeds man in the length of the nose.

The external ears are not immoveable in all men, nor moveable in all other mammalia, as in the ant-eaters for example.

Many quadrumana have an organ of touch, and an uvula, as well as man.

Varieties of the human Species.—Our next point is the consideration of the varieties of the human species, and their causes.

The differences which exist between inhabitants of different regions of the globe, both in bodily conformation and in the faculties of the mind, are so striking, that they must have attracted the notice even of superficial observers. There are two ways of explaining these: first, by referring the different races of men to different original families, according to which supposition they will form in the language of naturalists, different species; or we may suppose them all to have descended from one family, and account for the diversity, which is observable in them, by the influence of physical and moral causes; in which case they will only form different varieties of the same species.

This disquisition will perhaps appear superfluous to the devout believer, whose philosophy on this point will be derived from the writings composed with the assistance of divine inspiration, and therefore commanding our implicit assent. The account of the creation of the human race, and of its dispersion over the face of the globe, contained in the book of Genesis, will supersede in his mind the necessity of having recourse to any argument on the subject. We shall venture to submit, that the Mosaic account does not make it quite clear that the inhabitants of all the world descended from Adam and Eve: we are told indeed, that "Adam called his wife's name Eve, because she was the mother of all living." But in the first chapter of Genesis we learn, that God created man, male and female; and this seems to have been previously to the formation of Eve, which did not take place until after the garden of Eden had been made. Again, we are informed in the fifth chapter of Genesis, that "in the day that God created man, in the likeness of God made he him; male and female created he them; and blessed them, and called their name Adam, in the day when they were created." We find also that Cain, after slaying his brother, was married, although it does not appear that Eve had produced any daughters before this time. "Cain went out from the presence of the lord, and dwelt in the land of Nod, on the east of Eden. And Cain knew his wife, and she conceived and bare Enoch." Indeed it is said (ch. 5, v. 4.), that "the days of Adam, after he had begotten Seth, were eight hundred years, and he begat sons and daughters." This it should seem took place after the birth of Seth, and consequently, long after Cain had his wife; for Seth was not born till after the death of Abel. If Cain had sisters prior to that period, from amongst whom he might have taken a wife, it is singular, as some persons may allege, that Moses should not have noticed them. But we refer the solution of these difficulties to the biblical critic and commentary, in whose judgment they will not materially affect the general credibility of the Scripture history.

It appears, therefore, that the field is open for discussion on this subject; and at all events, if the descent of mankind from one stock can be proved independently of the holy writings, the conclusion will establish the authority of these inspired annals.

If we fail in tracing the succession of the human race from above downwards, much less are we able to trace back any particular tribe to their first origin from the present stock. To use the words of an elegant modern historian; "neither the annals nor traditions of nations reach back to those remote ages, in which the different descendants of the first pair took possession of the different countries where they are now settled. We cannot trace the branches of this first family, nor point out with certainty, the time and manner in which they divided and spread over the face of the globe. Even among the most enlightened people, the period of authentic history is extremely short, and every thing prior to that period is fabulous and obscure." In considering the present question, we must, therefore, be contented to proceed in the slow and humble, but sure method of observation; to ascertain carefully all the differences that actually exist between the various races of men; to compare these with the diversities observed among animals; and to draw our inferences concerning the causes from the analogies which these considerations may unfold. Above all things, we must enter our protest against arguments à priori on this subject. One philosopher tells us, that nature does nothing in vain; that she would not give herself the trouble to create several different stocks, when one family would be sufficient to colonise the world in a short space of time. Another, with equal speciousness, dilates on the absurdity of supposing, that immense regions should remain for ages an unoccupied and dreary waste, while the offspring of a single pair was slowly extending over the face of the earth; or that such an admirable variety of islands should display their charms in vain, till a shipwreck or some other casual occurrence may supply them with inhabitants. He shews how much more consonant to the wisdom and benevolence of the Deity it would be, for the earth to have teemed, from the first moment of its production, with trees and fruits, and to have been occupied by all kinds of animals

mals fuited to each foil and fky. We cannot too ftrongly exprefs our reprobation of fuch idle declamation, which, by withdrawing our attention from the right method of inveftigation, inevitably tends to perpetuate our ignorance of nature. Dr. Prichard, the author of an excellent inaugural difcourfe on this fubject, has fo well expofed the futility of fuch arguments, that we prefent our readers with his own words. "Hæc quanquam fatis fpeciofa videantur, omnia ut fit plerumque in hujufmodi argumentationibus fluxa et incerta funt. Qui magna loquuntur tanquam ipfi ex Dei concilio defcendiffent, neque ut humiles miniftros, et naturæ interpretes oportet, raro lumine quantulocunque ejus abdita illuftrant. Illi quidem dixerunt quomodo mundum conftituiffent, fi hoc eorum curationi fuiffet commiffum; fed qua ratione re ipfa conftitutus fit, talibus aufpiciis, et latet, et femper latebit." P. 5.

What is Species?—Before we proceed to the chief object of this divifion of our article, it is neceffary to confider what conftitutes a fpecies in zoology; and how varieties arife out of fpecies. We fhould anfwer, in the abftract, to the firft queftion; that all animals, which differ in fuch points only as might arife in the natural courfe of degeneration, belong to the fame fpecies; while thofe differences, which could not be accounted for on this fuppofition, would lead us to clafs the animals, which exhibit them, in different fpecies. But the chief difficulty, is to point out the characters, by which, in actual practice, we can diftinguifh mere varieties from genuine fpecific differences.

Of Breeding as a Criterion of Species.—In the fixteenth century, and confequently long before the time of Buffon, Ray referred to one and the fame fpecies thofe animals which copulated together, and produce a fertile offspring, afcribing the differences which may exift between them to adventitious caufes. The high authority of the great French naturalift, who adopted the fame opinion, has occafioned this criterion to be very generally relied on; Mr. Hunter, on the faith of it, included the dog, the wolf, and the jackal in one fpecies, and excluded the fox. If we adopt this, our prefent queftion would be immediately folved; for all the races breed together, and their progeny is prolific, either with each other, or with any of the original races. Indeed we know no difference in productivenefs between fuch unions and thofe of the fame race.

We apprehend that this rule involves a petitio principii; has it been proved, that animals of diftinct fpecies never produce together a fertile offspring? on the contrary, there are inftances, both among the mammalia and birds, of individuals belonging to fpecies univerfally held to be diftinct, uniting and producing young, which were prolific. That the mule can engender with the mare, and that the fhe-mule can conceive, was known to Ariftotle. The circumftance is faid to occur moft frequently in warm countries, but it has happened in Scotland. (Buffon, vol. iv. p. 200. 205.) The offspring of the he-goat and ewe feem to poffefs perfect powers of reproduction. The cock and hen canary birds produce with the hen and cock fifkin and goldfinch (ibid. v. xiv. p. 63, et feq.): the hen canary produces with the cock chaffinch, bullfinch, yellow-hammer, and fparrow. The progeny in all thefe cafes is prolific, and breeds not only with both the fpecies, from which they fpring, but likewife with each other. (Ibid. p. 70.) It appears alfo that the common cock and the hen partridge, as well as the cock and the guinea-hen, can produce together. (Ibid. v. xii. 61.) It is true, that all thefe unnatural unions take place in animals under the power of man, and that they generally require an attention to feveral preliminary circumftances: it is alfo found that unions of different fpecies may take place without fecundation, as of the bull and mare (Buffon, v. iv. p. 221.): but they prove fufficiently, that this affair of generation will not afford the criterion we are in fearch of.

It was foon found that this rule of reproduction could not be applied to domefticated animals, on account of their unnatural way of life, and hence Frifch, towards the beginning of the laft century, confined it entirely to the wild ones. And here it is of little fervice; for how can we expect ever to bring together thofe wild fpecies, particularly where they inhabit different countries, as for inftance the chimpanfee of Angola and the ourang-outang of Borneo? Nor are there fo many doubts about thefe, as about the domefticated animals, which are thus excluded.

The different breeds of dogs, for example, are referred by fome to different fpecies: others confider, that they have all defcended from the fhepherd's dog; others derive them from the jackal; and all the dogs with the latter animal, owe their origin, according to others, to the wolf.

Of other Marks.—Nor is the conftancy of any particular character to be deemed a mark of difference in fpecies. The white hair and red pupils of the white variety of the rabbit are as conftant as any fpecific characters; and we fee breeds of animals, produced under our own eyes, diftinguifhed by marks tranfmitted regularly to the offspring.

The Criterion of Analogy.—We muft therefore refort at laft to the criterion adopted by Blumenbach, and draw our notions of fpecies in zoology from analogy and probability. (De Gen. Hum. Variet. Nat. p. 70.) If we fee two races of animals refembling each other in general, and differing only in certain refpects, according to laws, which we have found to hold good in other inftances, we refer them to the fame fpecies without hefitation. "I fee" fays this moft acute and judicious naturalift, "a remarkable difference between the Afiatic and African elephants in the ftructure of the molar teeth. Whether thefe inhabitants of fuch diftant regions will ever be brought to copulate together, and whether this formation be univerfal is uncertain; but it exifts in all the fpecimens I have feen or heard of, and I know no example of molar teeth changed in fuch a manner by degeneration (or the action of adventitious caufes): therefore, I conjecture from analogy, that thefe elephants are not mere varieties but truly different fpecies. On the other hand, I hold the ferret (muftela furo) to be only a variety of the pole-cat (m. putorius), not fo much becaufe they produce together, but becaufe it has red pupils, and the analogy of numerous other inftances induces me to regard all the mammalia, which are deftitute of the colouring pigment of the eye, as varieties degenerated from their original ftocks."

It is very clear that this analogical method is the only one that we can adopt for folving the queftion concerning the varieties of the human fpecies; we muft explain the bodily diverfities of man upon the fame principles, as thefe of all other domeftic animals; and if we find thefe caufes adequate to the folution of the phenomena, it will be unneceffary to refort to the fuppofition of originally different fpecies.

A very fuperficial confideration will fhew, that there is no point of difference between the feveral races of mankind, which has not been found to arife, in at leaft an equal degree, among other animals as a mere variety, from the ufual caufes of degeneration. The inftances of this kind are derived chiefly from domefticated animals, as they are expofed to all thofe caufes which can produce fuch effects; by living with man they lead an artificial and unnatural kind of life, and are taken with him into climates and fituations, and expofed to various other circumftances altogether different

from

from their original deſtination; hence they run into numerous varieties of colour, form, ſize, &c. which, when they are eſtabliſhed as permanent breeds, would be conſidered by a perſon uninformed on theſe ſubjects, to be originally different ſpecies. Wild animals, on the contrary, remaining conſtantly in the ſtate for which they were originally framed, retain permanently their firſt character. Man, the inhabitant of every climate and ſoil, partaking of every kind of food, and of every variety in mode of life, muſt be expoſed ſtill more than any animal to the cauſes of degeneration.

Differences of Colour.—The various colours of the ſkin form very conſtant hereditary characters, moſt clearly influenced by that of both parents in the hybrid offspring of different varieties, having a cloſe and nearly uniform relation to that of the hair and iris, and indeed to the whole temperament of the individual; and for all theſe reaſons attracting moſt immediately the attention of a curſory obſerver.

The ſeat of this colour is in a thin mucous ſtratum, interpoſed between the cuticle, or dead ſurface of the body, and the true ſkin, and called rete mucoſum or Malpighii. The native reddiſh white of the real ſkin appears through this, which is very thin and almoſt colourleſs, in the white races of mankind. But in the darker varieties the rete mucoſum is much thicker, and contains throughout its ſubſtance a black pigment; while the cuticle and cutis deviate but little from the colour which they have in fair perſons. See INTEGUMENTS.

The different varieties of mankind exhibit every poſſible ſhade between the ſnowy whiteneſs of the Albino or of the moſt delicate European female and the jet black of the Negro. Although none of theſe gradations obtain ſo univerſally, as to be found in all the individuals of any particular nation, nor are ſo peculiar to one race, as not to occur occaſionally in other widely different ones, the national varieties of colour may be referred on the whole, with ſufficient accuracy, to the five following principal claſſes:

1. White, to which redneſs of the cheeks is almoſt wholly confined, being obſerved at leaſt very rarely, if at all, in the other varieties. This obtains in moſt of the European nations, in the weſtern Aſiatics, as the Turks, Georgians, Circaſſians, Mingrelians, Armenians, Perſians, &c. and in the inhabitants of the north of Africa.

Conſiderable variety, however, will be found to exiſt in the colour known by the general epithet white. That ſingular race of men, the Albinos, poſſeſs a milk-white or red ſkin and yellowiſh-white hair, with red eyes. In the natural hiſtory of our ſpecies they have not met with much better treatment than the poor Negroes; for ſome have doubted whether they, as well as the latter, belonged to the ſame ſpecies with us. The Negroes were thought to be too black, the Albinos too white. Their ſkin has an unnatural whiteneſs, often ſeeming to approach to a ſlight degree of lepra, and the hair of all parts of the body has the ſame character. The latter has not the ſnowy whiteneſs of old age, nor the elegant light yellow or flaxen appearance of the fair-haired in our climates (blondins, Fr.) but is rather to be compared to the appearance of cream; neither is the colour of the ſkin like that of the European, but it approaches to that of milk, or of a white horſe. The eye is deprived of its colouring matter; and hence the iris is of a pale roſe colour, and the pupil intenſely red, in conſequence of the blood contained in the numerous veſſels, which almoſt entirely make up the ſubſtance of thoſe parts. Thus, the colouring matter of the body, as well that of the ſkin (rete mucoſum), and hair, as that of the eye, (pigmentum nigrum, or more properly fuſcum) is deficient. Theſe affections of the ſkin and eye are always concomitant. This peculiarity always exiſts from the time of birth; it never changes afterwards, and it is ſometimes hereditary. The notion, that Albinos are incapable of propagation, is completely unfounded. They are in truth not numerous enough for them to breed together, and thus produce a permanent variety; but there are ſcattered inſtances to ſhew, that they can beget and conceive. A white negreſs bore a perfect negro to a negro father; and another produced with an European father three true Mulattoes, but with light hair. Blumenbach Beyträge zur Naturgeſchichte, p. 125. See ALBINOS, EYE, under the deſcription of the *Iris*, and INTEGUMENTS.

This variety was firſt obſerved in the African, as the great difference of colour would render the variation more ſtriking: and hence the individuals were termed Leucæthiopes or white negroes; their peculiar conſtitution, for the deviation is by no means confined to the ſurface of the body, may be conveniently termed, after ſome modern authors, Leucæthiopia. From their avoiding the light, the Dutch gave them (in the iſland of Java) the contemptuous appellation of Kakkerlakken (inſects ſhunning the light); the Spaniards called them Albinos, and the French Blafards. So far is this variety from being peculiar to the Negro, or even to the torrid zone, that there is no race of men, nor any part of the globe, in which it may not occur. Blumenbach has ſeen fixteen examples of it in various parts of Germany, and he refers to authors who have ſeen it in Denmark, England, Ireland, France, Switzerland, Italy, the Grecian Archipelago, and Hungary; in Arabia, on the coaſt of Malabar, in Madagaſcar, among the Caffres and Negroes, (as well thoſe born in Africa, as the deſcendants of the individuals conveyed to America); in the iſthmus of Darien and Brazil; in the iſlands of the Indian ocean and of the Pacific. De Gen. Hum. Variet. ſect. iii. § 78.

There is another deſcription of men with a very white ſkin, and often a roſy tint, particularly in the face, with yellow (flaxen) or red hair, and generally blue or whitiſh eyes (iris). The Germans, and nations deſcended from them, are of this kind.

Laſtly. There is a moſt extenſive race, including nearly all the nations enumerated in the firſt diviſion, with the ſkin, although white, poſſeſſing more or leſs of a brown tint, with black hair and dark eyes.

2. Yellow or olive (gilvus ſeu buxeus, a middle tint between that of wheat and the boiled quince or dried lemon peel), which characteriſes the Mongolian tribes, uſually called, together with the inhabitants of great part of Aſia, Tartars (Tatars.)

3. Red or copper colour (bronzé, Fr. an obſcure orange, or ruſty iron colour, not unlike the bark of the cinnamon tree) almoſt confined to the Americans.

4. Tawny or brown (badius, baſané, Fr. a middle tint between that of freſh mahogany and cloves or cheſnuts), which belongs to the Malays, and the inhabitants of the South ſea iſlands.

5. Black, in various ſhades from the ſooty colour or tawny black, to that of pitch, or jet black. This is well known to prevail very extenſively on the continent of Africa: it is found alſo in other very different and diſtant varieties of the human race, mingled with the national colour, as in the natives of Brazil, California, India, and ſome South ſea iſlands, as New Holland and New Guinea. The New Caledonians conſtitute an inſenſible tranſition, with the cheſnut coloured iſlanders of Tongataboo, from the tawny or brown Otaheitans to the black New Hollanders.

Intermediate Shades.—In deſcribing theſe varieties, we fix on the moſt ſtrongly marked tints, between which there is every conceivable intermediate ſhade of colour. The oppoſite extremes run into each other by the niceſt and moſt delicate gradations, in every other particular in which the human ſpecies differs. This forms no ſlight objection to the hypotheſis of different ſpecies: for, on that ſuppoſition, we cannot define the number of ſpecies, nor can we point out the boundaries that divide them; whereas, in animals moſt reſembling each other, the different ſpecies are preſerved pure and unmixed. Neither does the colour, which we deſcribe in general terms as belonging to any particular race, prevail ſo univerſally in all the individuals of that race as to conſtitute an invariable character, as we ſhould expect, if it aroſe from ſuch an uniform cauſe as an original ſpecific difference: its varieties, on the contrary, point out the action of other circumſtances. Thus, although the red colour is very prevalent on the American continent, travellers have obſerved fair tribes in ſeveral parts: as Bouguer, in Peru; Cook, at Nootka Sound; Humboldt, near the ſources of the Orinoco; and Weld, near the United States. The natives of New Zealand vary from a deepiſh black to an olive or yellowiſh tinge. In the Friendly Iſlands, they are of a complexion deeper than the copper-brown; but ſeveral of both ſexes are of the olive colour, and ſome of the women are much fairer.

Various Colours of Animals.—The domeſtic animals exhibit varieties entirely analogous to thoſe which we have juſt enumerated; a fact ſo familiarly known, with reſpect to the ſheep, pig, horſe, and cow, that it cannot be neceſſary to ſupport the aſſertion by any details. The leucæthiopic conſtitution, too, occurs in them as well as in the human ſubject: it has been obſerved (not to mention the well-known examples of the rabbit, ferret, mouſe, and horſe) in the monkey, ſquirrel, rat, hamſter, guinea-pig, mole, opoſſum, martin, weaſel, and roe. The crow, black-bird, canary bird, partridge, common fowl, and peacock, are ſometimes the ſubjects of it; but it has never been ſeen in any cold-blooded animal. Blumenbach, l. c.

Colour and Denominations of the mixed Breeds.—When two varieties copulate together, the offspring reſembles neither parent wholly, but partakes of the form and other peculiarities of both. This cannot with propriety be termed hybrid generation; as authors apply that expreſſion to the produce of the copulation of different ſpecies, as of the horſe and aſs, the canary bird and gold-finch, &c. In this ſenſe, hybrids are never produced in the human ſpecies. We read, indeed, various inſtances of this unnatural commerce, either where men, from depraved paſſions, ſolitary life, or miſtaken notions of ſanctity, have been connected with animals: ſee J. Warton, in a note on Theocr. Idyll. i. 88. p. 19. "Audivi ex docto quodam amico, qui per Siciliam inſulam iter faciens, ibidem cum vetera monumenta, tum populi mores accuratius inveſtigaverat, inter confeſſionis articulos a Siculis caprariis apud montes vitam ſolitariam degentibus, etiamnum per ſacerdotes proprios rite ſoleri exigi an rem cum hircis ſuis habuerint:" and M. Baumgarten, Peregrinatio in Ægyptum, Arabiam, &c. p. 73. "Ibi vidimus ſanctum unum Saracenicum, inter arenarum cumulos ita ut ex utero matris prodiit, nudum ſedentem. Audivimus ſanctum illum, quem eo loco vidimus, publicitus apprime commendari; eum eſſe hominem ſanctum, divinum, ac integritate præcipuum, eo quod nec feminarum unquam eſſet nec puerorum, ſed tantummodo aſellarum concubitor atque mularum:" or with the view of deriving benefit when ill, as Pallas ſtates; "Perſas iſchiade laborantes onagras inire," Neuen Nordiſchen Beyträgen, P. 2. p. 38: or, where women, from luſt or religious motives, have ſolicited the embraces of male animals, Steller of the Kamtſchatkan Women, in Beſchreibung von Kamtſchatka, p. 289; and the Mendeſian women with the ſacred goat, D'Hancarville Recherches ſur l'Origine des Arts de la Grece, tom. i. p. 320. The laws of various countries, too, have directed that the fruit of ſuch intercourſe ſhould be burned, or otherwiſe deſtroyed. Yet there is no inſtance, related by witneſſes worthy of credit, or with circumſtances ſufficient to authenticate it, of any offspring being produced. We only ſpeak of ſuch hybrids as reſult from the union of different varieties, as of the green and white canary birds; which unions have a moſt remarkable effect on the progeny, and are employed with wonderful advantage in improving the breeds of the domeſtic animals, particularly the horſe and ſheep.

Children, produced from the copulation of different races, exhibit in their colour the middle between the two tints of their parents. From a refinement of vanity, the inhabitants of the Spaniſh colonies in America have enriched their language with terms for the fineſt ſhades, which reſult from the degeneration of the primitive colour.

In the firſt generation, the offspring of Europeans and Negroes are called Mulattos. The word Creole (Criollo) has been frequently confounded with this, even by good writers; but that name (originally applied by the firſt Negroes, conveyed to America in the ſixteenth century, to their children born in that country, and borrowed by the Spaniards from them to denote their own offspring in the New World; Garcilaſſo del Origen de los Incas) belongs properly to the children of European parents born in the Eaſt or Weſt Indies. The offspring of Europeans and Indians are called Meſtizos; of Europeans and Americans, Meſtizos, alſo Meſtindi, Metiſi, and Mamelucki; of Negroes and Americans, Zambos or Sambos, alſo Mulattos, Lobos, Curibocas, and Kabuglos.

"The deſcendants of Negroes and Indian women bear at Mexico, Lima, and even at the Havannah, the ſtrange name of Chino, Chineſe. On the coaſt of Caraccas, and, as appears from the laws, even in New Spain, they are called Zambos. This laſt denomination is now principally limited to the deſcendants of a Negro and a female Mulatto, or a Negro and a Chineſe female." Humboldt's political Eſſay on New Spain, vol. i. p. 244.

All the above enumerated deſcriptions of perſons have the middle countenance and colour, formed by the union of thoſe of both parents; the latter is more or leſs brown or tawny, with hardly any viſible redneſs of the cheek. The hair of the Mulattos is curled; in the other inſtances ſtraight, and almoſt invariably black: the iris is dark. "A Meſtizo," ſays Humboldt, "is in colour almoſt a pure white; and his ſkin is of a particular tranſparency. The ſmall beard, and ſmall hands and feet, and a certain obliquity of the eyes, are more frequent indications of the mixture of Indian blood, than the nature of the hair." Ibid.

In the ſecond generation, two Mulattos produce Caſquos; Europeans and Mulattos, Tercerons, called by ſome authors Quarterons, Moriſcos, and even Meſtizos. The hair and countenance of theſe reſemble the European: the ſkin has a very ſlight brown tint, and the cheeks are red. The ſcrotum is blackiſh in the male, and the labia pudendi rather purple in the female.

Negroes with Mulattos produce Griffos (Zambos de Mulata, or Cabros); an European and Indian Meſtize, Caſtiſſos. "If a Meſtiza marry a white man, the ſecond generation differs hardly in any thing from the European race." (Humboldt, ibid.) From an European and American

rican Meſtizo come Quarterons (Quatralvi or Caſtiſſi); from an American and a Meſtizo, Tresalvos; from an American and Mulatto, Meſtizos; from an European and Zambo, Mulattos; from an American and Zambo, Zambaigos. The offspring of the Zambos are ſtyled in deriſion by the Spaniards Cholos; that of a Negro and Zamba is called Zambo prieto (black Zambo).

In the third generation, Europeans and Tercerons produce Quaterons or Quarterons (Ochavons, Octavons, or Alvinos), which, according to the moſt acute obſervers, retain no traces of their African original; a Mulatto and Terceron produce a Saltatra; an European and Caſtiſſo, a Polliſſo; an European and American Quarteron of the ſecond generation, an Octavon; a Quarteron and American Meſtizo of the firſt generation, a Coyota; a Griffo and a Zambo of the firſt generation, a Givero; a Zanbaigo and Mulatto, a Cambujo.

Some carry the genealogy of theſe hybrid races into the fifth generation, and call the children of Europeans and Quarterons, Quinterons (or Puchuelas); which name is alſo given to thoſe born of Europeans and American Octavons: but it is not credible that any trace of mixed origin can remain in this caſe, according to the obſervation of the moſt reſpectable eye-witneſſes concerning the third generation; that in colour and habit of body they cannot be diſtinguiſhed from their European progenitors.

In countries with a mixed population, governed by whites, the families reputed to have the leaſt mixture of black blood are naturally the moſt honoured. In America, the greater or leſs whiteneſs of the ſkin decides the rank which an individual occupies in ſociety. When a common man diſputes with one of his ſuperiors, he is frequently heard to ſay, "Do you think me not ſo white as yourſelf?" It becomes, conſequently, a very intereſting buſineſs for the public vanity to eſtimate accurately the fractions of European blood which belong to the different caſts. The proportions are repreſented below, according to the principles ſanctioned by uſage.

Parents.	Offspring.	Degree of Mixture.
White and Black,	Mulatto,	$\frac{1}{2}$ white $\frac{1}{2}$ black.
White and Mulatto,	Terceron,	$\frac{3}{4}$ white $\frac{1}{4}$ black.
Black and Mulatto,	Griffo or Zambo,	$\frac{3}{4}$ black $\frac{1}{4}$ white.
White and Terceron,	Quarteron,	$\frac{7}{8}$ white $\frac{1}{8}$ black.
Black and Terceron,	Quarteron,	$\frac{7}{8}$ black $\frac{1}{8}$ white.
White and Quarteron,	Quinteron,	$\frac{15}{16}$ white $\frac{1}{16}$ black.
Black and Quarteron,	Quinteron,	$\frac{15}{16}$ black $\frac{1}{16}$ white.

The two latter are reſpectively reputed white and black; the former are white by law, and conſequently free in our Weſt India iſlands. They are not diſtinguiſhable from pure whites in complexion, features, or hair.

Thus, in obedience to that principle, by which the properties of the offspring depend on thoſe of the parents, we have the power of changing one ſpecies into another by repeated intermixture. If the offspring of a white woman and a black be matched with a black man, and this proceſs be repeated two or three times, the form of the original mother is entirely loſt, and that of the father ſubſtituted; or, *vice verſâ:* and the ſame may be done with plants.

Exceptions to the Law concerning the Colour of the mixed Breeds.—Although the children generally partake of the character of both parents, they ſometimes reſemble one only; and in ſuch a caſe, the influence of the other is often obſerved in the ſecond or third generation. We ſee children like their grandſires, and unlike the father and mother.

> "Fit quoque, ut interdum ſimiles exiſtere avorum
> Poſſint, et referant proavorum ſæpe figuras.
> * * * * * * * *
> Inde Venus varias producit ſorte figuras,
> Majorumque refert voltus, voceſque, comaſque."
> Lucretius, lib. ii.

Thus, a white Negreſs (Albineſs) married an Engliſhman, and brought forth three true Mulattos, but with light hair. (Blumenbach, Beyträge, p. 125.) The offspring of a black and white may be either black or white, inſtead of being mixed; and in ſome rare caſes it has been ſpotted.

A black man married a white woman in York, who in due courſe of time had a child that was entirely black, and very much like the father both in colour and features, without the leaſt participation of the features or colour of the mother. A black man married a white woman in London, who afterwards had a daughter as fair as any one born of white parents, and like the mother in features; but her right buttock and thigh were as black as the ſkin of the father. A Negro woman had a white daughter by a man of her own race: white children had been frequently born in his family, and his own father was one of theſe; but his grandfather and grandmother were black. Parſons in Phil. Tranſ. vol. lv.

A Negreſs had twins by an Engliſhman: the one was perfectly black, with ſhort, woolly, curled hair; the other was white, with long hair. White on the regular Gradation, p. 122.

Production of Varieties.—It is a general law, that animals produce their like; and thus ſpecies and races preſerve uniformity of character. But this reſemblance between children and their parents is not conſtant: the former, under certain circumſtances, differ from the latter; and thus we have perſons in each race, with characters approaching to thoſe of the other races. In European countries, ſcattered inſtances of individuals, with ſkins nearly as dark as thoſe of the Mongols or South ſea iſlanders, are not unfrequent. Forſter, in his voyage round the world, ſaw a man with fair ſkin and red hair in an iſland, where the inhabitants in general are nearly black. Among the Otaheiteans, who are deſcended from the Malay race, light complexions and flaxen hair are not very uncommon; and red-haired individuals have been obſerved in moſt of the dark coloured nations, as the Wotiaks, Eſquimaux, iſlanders of New Guinea and New Zealand, and the Negroes. (Blumenbach, p. 169.) Again, the origin of Albinos, particularly in the black nations, is a remarkable example of native variety of colour.

Inſtances analogous to theſe are of daily occurrence among animals, as in the production of black ſheep, cats, horſes, foxes, &c. White ſheep produce black lambs; and grey rabbits may bring forth either white (leucæthiopic) or black ones. Two common peacocks produced fourteen young: two of them were white, and the reſt reſembled their parents. (Buffon, vol. xii. p. 286, note.) Leucæthiopic animals are conſtantly produced from thoſe of the ordinary characters.

The native varieties, thus produced, are propagated by generation,

generation, and become eſtabliſhed as permanent breeds, if individuals with theſe new characters conſtantly intermix. Thus, the leucæthiopic conſtitution has become fixed in the white rabbit and ferret; and thus, before our eyes, as great a deviation from the common ſtock has been formed, as any in the human race. Black rams are always rejected in breeding, becauſe they would transfer this colour to their progeny. In many parts of England, all the cattle are of one colour: this ariſes from the long-eſtabliſhed cuſtom of ſlaughtering all the calves which have not the deſired tint. (Prichard de Hom. Variet. p. 32.) We have no reaſon to doubt, that if the ſame plan were adopted with the human ſubject, that is, if perſons marked by certain native peculiarities were united, their offspring again matched with ſimilar individuals, and this conſtantly repeated, that any native variety might be fixed as a permanent breed. Human Albinos are ſo few, that this cannot be effected; and hence we have no race like the ferret or white rabbit. Travellers indeed report, that tribes of Albinos are found in Java, where they are called Kakkerlakken (Chacrelas); in Ceylon, (Bedas); and in the iſthmus of Darien. (See Buffon, vol. iii. p. 328. 344. 419.) The ſtatement concerning the latter is the moſt circumſtantial, and poſſeſſes the ſtrongeſt appearance of authenticity: but none of thoſe, who ſpeak of theſe white Indians, ſaw more than one or two of them; and we believe that ſubſequent reports have by no means corroborated the notion that whole nations of ſuch people exiſt. Hence we are to regard leucæthiopia as having occurred only in ſcattered inſtances in the human ſubject, and as having been very rarely tranſmitted by generation, becauſe the individuals are not numerous enough for them to breed together.

The diſpoſition to change is exhauſted in one generation, and the characters of the original ſtock return, unleſs the variety is kept up in the manner above mentioned; that is, when Albinos intermix with the common race, the offſpring reſembles the latter. A white Negreſs brought forth to a Negro a perfectly black ſon. (Blumenbach, Beyträge, p. 125.) And the ſame circumſtance is ſeen in vegetables: the variegated holly can only be preſerved as a variety by grafting; when we attempt to propagate it by ſeed, it returns to the common green holly.

In conſidering this as an explanation of the varieties of colour, an objection will probably occur; that we do not, in point of fact, ſee Negroes or Americans produced among the white races, nor Europeans among the former. If it were neceſſary to our theory to prove that ſuch varieties do occur, we ſhould deem it untenable: but the Negro and the European are the two extremes of a very long gradation; between them are almoſt innumerable intermediate ſtages, which differ from each other no more than the individuals, occaſionally produced in every race, differ from the generality of the race.

Spotted Individuals. — Examples occur of individuals ſpotted with different colours; but they are by no means ſo common as thoſe of ſpotted animals. See, on this ſubject, the *variations in the formation of the ſkin*, in the article Monster.

Other Properties of the Skin.—The ſkin differs in ſome other properties beſides its colour. Travellers have deſcribed it as remarkably ſoft and ſmooth, and as it were ſilky, in the Carib, Negro, Otaheitean, and Turk. It ſecretes a matter of peculiar odour in ſome races. "The Peruvian Indians," ſays Humboldt, "who, in the middle of the night, diſtinguiſh the different races by their quick ſenſe of ſmell, have formed three words to expreſs the odour of the European, the Indian American, and the Negro: they call the firſt pezuña, the ſecond poſco, and the third graio." Humboldt, p. 245.

The hair, as it grows and is nouriſhed from the common integuments, is connected with them in many points by a cloſe kind of ſympathy. Hence the ſpotted Africans have white hairs growing out of a white patch on the head. The four laſt of the varieties mentioned in the deſcription of the colours of men, have black hair; and in the firſt, or the white, every gradation from the fair to the dark, is accompanied by correſpondent alterations in the hair. This is true, not only of nations, but alſo of individuals in the white races. A light complexion and thin ſkin are accompanied with red or fair hair; a dark one, and thick ſkin, with black hair, almoſt invariably, even in individuals of the ſame family; a difference, which, according to the philoſophy of ſome writers, would be a ſufficient ground for claſſing them in different ſpecies. The other properties of the hair vary, as well as its colour; and theſe changes may be brought under the four following varieties:

1. Browniſh, deviating into red on one ſide and black on the other; this is copious, ſoft, and long, and ſlightly undulated. It obtains in moſt of the temperate climates of Europe, and formerly attracted particular notice in the ancient Germans. The thin and white ſkinned Albino has the ſofteſt and fineſt hair, of a white colour: in the Germanic race it is alſo very ſoft; and red hair is uſually found in conjunction with a thin and ſoft ſkin. The Celtic and Slavonic races, which make up the chief population of Europe, and the eaſtern Aſiatics and northern Africans have generally, with a rather thicker and darker ſkin, ſtronger, black, or darkiſh brown, and often more or leſs curling hair.

2. Black, ſtrong, ſtraight, and thin; occurring in the Mongolian and American races.

3. Black, ſofter, denſe, copious and curled; obſervable in moſt of the South Sea iſlanders.

4. Black, and criſp, ſo as generally to be called woolly; common to all the Ethiopians.

The analogy, on which the covering of the Africans has thus been called wool, is quite a looſe one, and goes no further than a ſlight reſemblance in appearance. The filament in wool is rough on its ſurface, in the hair it is ſmooth: the latter is of uniform thickneſs throughout, or rather ſlenderer towards the point, while the former is unequal in ſize, and rather larger towards its end. The wool is detached altogether, while the hairs fall off ſeparately. In none of theſe characters does the hair of the African agree with wool.

The above diviſion, although ſufficient for general purpoſes, is not uniformly true. For the woolly hair is not confined entirely to the Ethiopians, nor is the black colour invariably found in all the three laſt varieties. Some tribes of Africans have long hair, (Bruce of the Gallas) and other red coloured people, as thoſe of the Duke of York's iſland, have it ſtrongly curled. The New Hollanders form ſo complete a medium between the woolly haired African, and the copious curling hair of the other South Sea iſlanders, that we are completely puzzled how to claſs them. Individual inſtances of red hair occur in all the three laſt varieties.

The ſoft white hair of the Albino may be produced in any race of mankind; and is moſt widely different from the black hair of the dark varieties.

The animal kingdom furniſhes us with numerous parallel inſtances of varieties in the colour and texture of the hair; as, for example, in the black ſheep, black and white horſes, &c. The ſheep exhibit every kind of covering, from the delicate

delicate fleeces of Thibet or Spain, to the coarſe and rough hair which takes the place of wool in many warm countries.

The briſtles of the pig are ſo ſoft in ſome kinds, as in Normandy, that they are not applicable to the manufacture of the ordinary inſtruments. The wild pig has a ſoft curling hair interpoſed between its briſtles, which is entirely loſt in the domeſticated animal.

Sheep, rabbits and cats in Angora, a ſmall diſtrict of Aſia Minor, are remarkable for the length and ſoftneſs, as well as ſnowy whiteneſs of their coverings.

The ſheep of ſome of the Tatar tribes have hairs mixed with the wool: ſuch a mixture is obſerved even in this country, where the breed is neglected; and it occurs in the Argali, the ſuppoſed wild origin of our flocks. In theſe caſes, if the animals with the beſt fleeces are ſelected to breed from, and this rule be obſerved conſtantly, the wool would be gradually improved, and the hairs diſappear; or *vice verſa*, the ſheep would become entirely hairy.

A child born in Yorkſhire of European parents, had the woolly hair; and this is not the only example. Prichard de Generis Hum. Variet. p. 26.

It muſt appear very clearly, from theſe analogies, that the differences of the hair will not warrant us in eſtabliſhing diſtinct ſpecies of men.

Together with the differences of the hair we may mention thoſe of the beard. This growth is ſmall in quantity, and thin in many tribes of the Mongolian, African and American races. "One of the moſt general characters of the ugly nations," ſays Meiners, "is either an entire want of beard, or a very thin one, developed at a later period than uſual: on the contrary, a copious beard has always been the pride of the handſome races. Dark coloured nations, with ſtrong beards, are not much more numerous than individuals of handſome people with a weak growth." Grundriſs, p. 98.

Unfounded reports have been generally received of its entire abſence in the Americans, and this circumſtance has been repreſented as a characteriſtic peculiarity of the race. The concurring teſtimonies of all accurate modern travellers prove clearly that the Americans have naturally beards; that it is a very general cuſtom with them, as it has been with ſeveral Mongolian and Malay tribes, carefully to eradicate this excreſcence; but that various hordes in different parts of the continent preſerve it as other men do. Gmelin found this practice in Aſia. "It is not eaſy to find a Tunguſe, nor any man of the neighbouring tribes, with a beard. For they extract the hairs as ſoon as they appear, and repeat this proceſs until at laſt no more are formed." (Reiſe durch Sibirien, t. 2. p. 125.) The ſame circumſtance is reported of the Sumatrans by Marſden; of the Mindanao iſlanders by Forreſt; of the Pelew iſlanders by Wilſon; the inhabitants of New Guinea by Carteret; and thoſe of Navigators iſles, by Bougainville. From a cloud of unanimous teſtimonies concerning the Americans, we extract the following ſtatement of Cook reſpecting the inhabitants of Nootka Sound: "Some have no beards at all, and others only a thin one on the point of the chin. This does not ariſe from an original deficiency of hair in thoſe parts, but from their plucking it out by the roots: for thoſe, who do not deſtroy it, have not only conſiderable beards on every part of the chin, but alſo whiſkers, or muſtachios, running from the upper lip to the lower jaw obliquely downwards." (Laſt Voyage, v. 2. p. 240.) The teſtimony of Humboldt concerning the South Americans is to the ſame effect: "The Mexicans, particularly thoſe of the Aztec and Otomite races, have more beard than I ever ſaw in any other Indians of South America. Almoſt all the Indians in the neighbourhood of the capital wear ſmall muſtachios."—"I can affirm that the Indians, who inhabit the torrid zone of South America, have generally ſome beard; and that this beard increaſes when they ſhave themſelves."—"Mr. de Galeano, in the account of the laſt Spaniſh expedition to the Straits of Magellan, informs us that there are many old men among the Patagonians with beards, though they are ſhort, and by no means buſhy." (Political Eſſay on the Kingdom of New Spain, v. 1. p. 147.) The exiſtence of a beard, and the habit of extirpating it, are mentioned of the Greenlanders, by Cranz, Geſchichte von Grönland; by Charlevoix of the Eſkimaux, Nouvelle France, iii. p. 179: by Oldendorp of the Caribs, Geſchichte der Miſſion auf den Karaibiſchen Inſeln; p. 22: By Wafer of the Americans at Panama, Iſthmus of America, p. 106; by Bougainville of the Patagonians, Voyage autour du Monde; and by Parkinſon, of the inhabitants of Terra del Fuego, voyage v. 1. Commerſon ſpeaks of the whiſkers of the Patagonians, Journal Encyclop. 1772.

Colour of the Iris.—We have juſt explained how the hair is connected with the ſkin: that a ſimilar connexion in point of colour exiſts between the latter organ and the eyes, was noticed by Ariſtotle, who obſerved that white perſons have blue eyes, and black ones black. Thus, in Germany, Blumenbach ſays that newly-born children have generally blue eyes and light hair, and that both grow gradually dark together in individuals who become dark. Again, the pigmentum of the eye loſes much of its colour in proportion as the hair grows grey in the old ſubject. With their peculiar hair and ſkin, the Albinos have an entire deficiency of the pigment, and conſequently a pale red iris. Thoſe animals only which vary in the colour of the ſkin and hair, have differently coloured irides; and this is true, not only of men and horſes, according to the opinion of the ancients, but of other animals, particularly in the domeſticated ſtate. Moreover, the iris is often variegated in animals which have a ſpotted ſkin. This has been noticed in dogs (Comment. Inſtit. Bonon. t. iii. p. 281.). Blumenbach has obſerved ſomething of it in horſes and ſheep, but more particularly in rabbits: the grey, or thoſe which have the native colour of their wild ſtate, have dark irides; the ſpotted have them marked with different colours; and the white, like other Leucæthiopic animals, have them of a pale roſe colour.

The three principal colours of the human eye were well laid down by Ariſtotle; *viz.* 1, blue, paſſing, in its lighter tints, to what we call grey; 2, an obſcure orange, which he calls the colour of the eye in the goat (Gall. Yeux de Chevre:) it is a kind of middle tint, between blue and orange, and ſometimes remarkably green in men with red hair and freckled ſkin; and 3, blackiſh brown.

Theſe may all occur in different individuals of the ſame race; and again, they are ſometimes confined to the different tribes of the ſame country, within the boundaries of a few degrees. Thus Linnæus deſcribes in Sweden the Gothlander with light hair and greyiſh-blue eyes; the Fin with yellow hair and brown iris; and the Laplander with black hair and iris. Blue eyes, as well as yellow hair (rutilæ lat. denoting the reſemblance to gold, whence auricomi Batavi, Silius; ξανθος, Gr.) were formerly ſet down among the characters of the Germans (cærulei oculi, rutilæ comæ, Tacitus); and the ſame combination is met with in ſcattered inſtances, in the moſt remote nations. The iris of the negro is the moſt intenſely black, ſo that very cloſe inſpection is neceſſary, in living individuals, to diſtinguiſh it from the pupil.

Differences of Form.—The exiſtence of great variations in the

the conformation and proportions of the body in all animals, and particularly of the features of the human countenance, fubject, however, to certain fixed rules as to the general model, accords entirely with what we obferve throughout all nature.

" Præterea genus humanum, mutæque natantes
Squammigerum pecudes, et læta armenta, feræque,
Et variæ volucres ; lætantia quæ loca aquarum
Concelebrant, circum ripas, fontefque, lacufque ;
Et quæ pervolgant nemora avia pervolitantes ;
Horum unum quodvis generatim fumere perge :
Invenies tamen inter fe diftare figuris.
Nec ratione alia proles cognofcere matrem,
Nec mater poffit prolem ; quod poffe videmus,
Nec minus atque homines inter fe nota cluere."

National Features.—Although it is a common and very juft obfervation, that two individuals are hardly to be met with poffeffing exactly the fame features, yet there is generally a certain caft of countenance common to the particular races of men, and often to the inhabitants of particular countries. The five following varieties are eftablifhed by Blumenbach, after a careful comparifon of numerous drawings, and of the various races themfelves, in fituations, where commerce attracts them from all parts of the globe, as at London and Amfterdam.

1. An oval and ftraight face, with the different parts moderately diftinct from each other : forehead rather flattened, nofe narrow, and flightly aquiline, or at leaft with the dorfum fomewhat convex ; no prominence of the cheek-bones ; fmall mouth, with lips flightly turned out, particularly the lower one ; a full and rounded chin.

This is the kind of countenance which accords moft with our ideas of beauty : it may be confidered as a middle, departing into two extremes, exactly oppofed to each other ; of which one confifts in a lateral expanfion of the face, and the other in its being extended downwards. Each of thefe includes two varieties, which are moft readily diftinguifhed by a profile view ; one, in which the nofe and other parts run together, and the other, in which they are more prominent and feparate.

2. Broad and flattened face, with the parts flightly diftinguifhed, and as it were running together : the fpace between the eyes flat and very broad ; flat nofe, rounded projecting cheeks ; narrow and linear aperture of the eye-lids extending towards the temples (Yeux bridés, Fr.) chin flightly prominent.

This is the face of the Mongolian tribes; commonly called in Englifh the Tartar face, from the confufion of the Tartars (Tatars) with the Monguls.

3. Face broad, but not flat and depreffed, with prominent cheek-bones, and the parts, when viewed in profile, as it were, more deeply and diftinctly carved out. Short forehead ; eyes deeply feated ; nofe flattifh, but prominent. Such is the countenance of moft of the Americans.

4. Narrow face, projecting towards its lower part ; arched forehead ; eyes prominent (à fleur de tête) ; a thick nofe, confufed on either fide with the projecting cheeks (nez épaté) ; the lips, particularly the upper one, very thick ; the jaws prominent ; and the chin retracted. This is the countenance of the Negro—the Guinea face.

5. The face not fo narrow as in the preceding, rather projecting downwards, with the different parts in a fide-view, rifing more freely and diftinctly. The nofe rather full and broad, and thicker towards its apex (bottle-nofed). The mouth large. This is the face of the Malays, particularly of the South Sea iflanders. Excellent reprefentations of celebrated individuals of thefe five varieties may be feen in Blumenbach's Abbildungen Naturhiftorifcher Gegenftände, part i. ; alfo, in his Beyträge zur Naturgefchichte.

Intermediate Gradations and Varieties in the different Races.—In this refpect, as in colour, the different characters run into each other by the moft gentle gradations ; fo that, although any two extremes, when contrafted, appear ftrikingly different, they are connected by numerous intermediate and very flightly differing fhades ; and no formation is exhibited fo conftantly in all the individuals of one race, as not to admit of numerous exceptions.

In the Africans.—We fee, indeed, an aftonifhing difference, when we place an ugly Negro (for there are fuch as well as ugly Europeans), againft a fpecimen of the Grecian ideal model ; but, when we trace the intermediate gradations, this ftriking diverfity vanifhes. " Of the Negroes of both fexes," fays Blumenbach, " whom I have attentively examined, in very confiderable number, as well as in the portraits and profiles of others, and in the numerous Negro crania, which I poffefs, or have feen, there are not two completely refembling each other in their formation : they pafs, by infenfible gradations, into the forms of the other races, and approach to the other varieties even in their moft pleafing modifications. A Creole, whom I faw at Yverdun, born of parents from Congo, and brought from St. Domingo by the chevalier Treytorrens, had a countenance, of which no part, not even the nofe, and rather ftrongly marked lips, were very ftriking, much lefs difpleafing : the fame features, with an European complexion, would certainly have been generally agreeable." (Beyträge zur. Naturgefchichte, p. 89.) The teftimony of Le Maire, in his journey to Senegal and Gambia, is to the fame effect ; that there are Negreffes, except in colour, as handfome as European women. Vaillant fays of the Caffre women, that, fetting afide the prejudice which operates againft their colour, many might be accounted handfome, even in an European country. The accurate Adanfon confirms this ftatement, in his defcription of the Senegambians. " Les femmes font a peu prés de la taille des hommes, également bien faites. Leur form eft d'une fineffe et d'une douceur extrême. Elles ont les yeux noirs, bien fendus, la bouche et les levres petites, et les traits du vifage, bien proportionnés. Il s'en trouve plufieurs d'une beauté parfaite. Elles ont beaucoup de vivacité, et fur tout un air aifé de liberté qui fait plaifir." (Hift. Nat. du Senegal, p. 22.) The Jaloffs, according to Mungo Park, have not the protuberant lip, nor flat nofe of the African countenance. We have alfo the teftimony of another traveller, concerning this tribe, to the fame effect : the Jaloffs, according to Moore, have handfome features, and neither broad nofes nor thick lips. (Zimmermann Geographifche Gefchichte, &c. vol. i. p. 99.) Pigafetta ftates, that the Congo Negroes have not the thick lips of the Nubians, and that, except in colour, they are very like the Portuguefe. (Relazione del Reame di Congo, Roma, p. 12.) Dampier, in his account of Natâl, defcribes the natives as having curled hair, but a long face, well-proportioned nofe, and agreeable countenance. The fix Negro crania engraved in the two firft decades of Blumenbach, exhibit very clearly this diverfity of character in the African race ; and prove, moft unequivocally, that the variety among individuals is certainly not lefs, but greater than the difference between fome of them and many Europeans. See Decas Craniorum, p. 22, and Decas Altera, p. 13.

In the Americans.—The fame obfervations hold good of the American race. The moft accurate obfervers treat with contempt the hyperbolical affertion of fome, that all the inhabitants of the New World have one and the fame countenance, fo that he who has feen one may fay that he has feen all,

all. "Rido fra me stesso," says Molina, "quando leggo in certi scrittori moderni riputati diligenti osservatori, che tutti gli Americani hanno un medesimo aspetto, e che quando se ne abbia veduto uno, si posse dire di avergli veduti tutti. Codesti autori si lasciarono troppo sedurre da certe vaghe apparenze di somiglianza procedenti per lo piu dal colorito, le quali svaniscono tosto che si confrontano gl' individui di una nazione con quelli dell' altra. Un Chilese non si differenzia meno nell' aspetto da un Peruviano, che un Italiano da un Tedesco. Io ho veduto pur dei Paraguaii, de'Cujani, e dei Magellanici, i quali tutti hanno dei lineamenti peculiari, che li distinguono notabilmente gli uni dagli altri." (Storia Naturale del Chili, p. 336. We have further unexceptionable testimony to prove that the same variety of countenance is found in the Americans as in other races; although generally the countenance follows the model above described. In South America only we have the Caaiguas with flat noses, observed by Nic. del Techo; the neighbouring Abipons, of whom many individuals have aquiline noses, by Martin Dobrizhoffer; the Peruvians with narrow and aquiline nose by Ulloa; the Chilese with rather a broad nose by Molina; and the islanders of Terra del Fuego with a very depressed one by G. Forster. The truth of this representation is most fully attested by Humboldt, whose accuracy and extensive opportunities entitle his observations to the most implicit deference. "In the faithful portrait, which an excellent observer, Mr. Volney, has drawn of the Canada Indians, we undoubtedly recognise the tribes scattered in the meadows of the Rio Apure and the Carony. The same stile of feature exists, no doubt, in both Americas; but those Europeans who have sailed on the great rivers Orinoco and Amazons, and have had occasion to see a great number of tribes assembled under the monastical hierarchy in the missions, must have observed that the American race contains nations, whose features differ as essentially from one another, as the numerous varieties of the race of Caucasus, the Circassians, Moors, and Persians, differ from one another. The tall form of the Patagonians is again found by us, as it were, among the Caribs, who dwell in the plains from the delta of the Orinoco, to the sources of the Rio Blanco. What a difference between the figure, physiognomy and physical constitution of these Caribs, who ought to be accounted one of the most robust nations on the face of the earth, and are not to be confounded with the degenerate Zambos, formerly called Caribs of the island St. Vincent, and the squat bodies of the Chayma Indians of the province of Cumana! What a difference of form between the Indians of Tlascala and the Lipans and the Chichimeos of the northern part of Mexico." Political Essay on the Kingdom of New Spain, v. i. p. 142.

In the South Sea Islanders.—An analogous variety has been noticed in the features of the Friendly islanders: "their features are very various; insomuch, that it is scarcely possible to fix on any general likeness by which to characterize them, unless it be a fulness at the point of the nose, which is very common. But, on the other hand, we met with hundreds of truly European faces, and many genuine Roman noses amongst them." Cook's Last Voyage, v. i. p. 380.

In Europeans.—Again, particular individuals in Europe often have the countenance exactly resembling the Negro, or Mongol face.

Differences in the Skull.—The form of the cranium in the different varieties of man has been described in the article Cranium; in which the causes of the diversities of its figure are also considered. We have one or two additional remarks to make, particularly concerning the Negro. "The bony apparatus," says Soemmerring, "concerned in mastication, as well as the part of the face containing the organs of sense, are, whether considered generally or particularly, stronger, thicker, and more advantageously disposed for this strength in the Negro, than in the race where more extensive use of experience and reason, and greater cultivation supply the place of what is deficient in animal strength. Should we take the bones of the face in the Negro, as a basis, and add to them a cranium, according to the proportions observed in European heads, the space allotted for the reception of the organ of thinking would exceed the size that it has in us. Von der korperl. Verschiedenheit, § 12. The ridge that bounds the origin of the temporal muscle is more prominent, and rises much higher on the side of the head in the Negro, than in the European; consequently, the muscle is considerably larger, and the bony arch surrounding it (the zygoma), is larger, stronger, and more capacious. (Ibid. § 16 and 17.) Both openings of the nose are more ample, and the cavity itself considerably more capacious than in the European. The thin convoluted plates of the ethmoid bone are larger, and consequently increase the extent of the pituitary membrane: the cribriform plate is remarkably large. These circumstances of anatomical structure are not, however, peculiar to the Negro: Soemmerring finds the nasal cavity in the cranium of a North American savage still more ample than in most Negroes. (Ibid. § 21 and 22.) The instances related of the fineness of smell in these people, such as their being able to distinguish Europeans from Negroes and Americans, &c. correspond to what we observe in their organs.

"The nerves," says this anatomist, "connected with the basis of the brain, appear to me, in comparison with an European brain of the same size, to be, in proportion, rather larger; at least the olfactory, the fifth, and the facial nerves, are remarkably large, as we might have expected, from the greater size of the nose and face." § 56.

The relation between the cranium and face is best seen in a vertical section carried from before backwards: the area of the face, independently of the lower jaw, is about one-fourth of the cranium in the European: in the Negro, the cranium remaining the same, the face increases by about one-fifth. The proportion still increases in the ourang-outang: in the sapajous, the mandrils, and most of the carnivora, the face and cranium are about equal.

The ossa nasi of the Negro, instead of forming the bridge-like convexity which we see in the European, are nearly flat, and run together into an acute angle above, which makes them very much resemble the single triangular nasal bone of the ape. But in one cranium they exactly resemble the European. Ibid. § 19.

The varieties in the form of the teeth are also considered in the article Cranium.

Supposed Causes of Difference of Features: Climate.—That the national differences of features owe their origin to climate, has been the opinion of many philosophers; and some have even attempted to shew how the effect is produced. "En effet," says Volney, "j'observe que la figure des Negres représente precisément cet état de contraction que prend notre visage, lorsqu'il est frappé par la lumière et une forte réverbération de chaleur. Alors le sourcil se ferme; la pomme des joues s'élève; la paupière se serre; la bouche fait la moue. Cette contraction, qui a lieu perpétuellement dans le pays nud et chaud des Nègres, n'a-t-elle pas dû devenir le caractère propre de leur figure?" Volney, Voy. en Syrie et en Egypte, t. i. p. 74. It is unfortunate for these speculations that the most opposite kinds of features occur under similar climates in different parts of the world; and that there are races with flattened countenances, as well as with prominent ones in hot countries. Thefe caufes, too, could only affect the foft parts: a negro might "faire la moue" to eternity, without altering the whole bony compages of his head. Indeed, the whole account is fo fanciful, that it hardly deferves ferious attention. If there were any foundation for the fuppofition, we might expect Mr. Volney's countrymen, from their well-known habit of fhrugging the fhoulders, to have become long ago the higheft fhouldered race in the world.

Artificial Preffure.—The cuftom of carrying the children on the back has been referred to by others, in order to explain the flat nofe of the Negro: in the violent motions required for their hard labour, as in beating or pounding the millet, &c. the face of the young one is faid to be conftantly beating againft the back of the mother. The teftimonies concerning the employment of preffure, with a view to flatten the nofe, are fo numerous and refpectable, that we cannot refufe to believe that it is attempted. (See Blumenbach, de Varietate, p. 193.) But two reafons prevent us from afcribing any efficacy to thefe practices in producing the national varieties of the cranium. The diverfities extend fo generally through the whole bony fabric of the head, and are obfervable in fo many parts, where external preffure could have no influence, not to mention that they confift, in many inftances, of formations juft the reverfe of what preffure would effect, that we muft afcribe them to native variety. This determination is confirmed by the difcovery, that all the peculiarities of the Negro cranium exift in the fœtus. The refearches of Blumenbach, Camper, Soemmerring, Ludwig, and Loder, have proved this fact concerning Negro fœtufes of various ages, in whom they find the fame prominence of the jaws, flat nofe, &c. as in the adult. (Soemmerring von der körperl. Verfchiedenheit, § 4. Ludwig Grundrifs der Naturgefchichte der Menfchen Species, p. 121.) The children of Negro parents in Europe, America, and other fituations, where there are opportunities of knowing that no means are ufed to flatten the nofe, refemble, in all refpects, thofe born in Africa. Thefe arguments receive a further confirmation from three of the crania engraved by Blumenbach, of a Jewifh girl, five years old, a Mongolian child, a year and a half, and a newly born Negro, in which the characters of the Caucafian, Mongolian, and Ethiopian varieties are as ftrongly reprefented as in the heads of adults. Decas tertia, tab. 28—30. p. 14.

In the form and proportions of other parts, there are not fewer differences than in the compofition of the features.

Differences in the Form and Proportions of other Parts.—Connection of the Head and Trunk.—In confequence of the foramen magnum being placed further back in the head in the Negro than in the European (fee CRANIUM), and of the head of the former being confequently placed further forwards on the vertebral column, the occiput projects lefs behind the fpine. Hence, a line drawn from the occiput along the nape of the neck, is nearly ftraight in the Negro, but it dips in confiderably under the head in the European; as if a part of the cranium had been fliced off in the former. The fame circumftance may be obferved in a much more ftriking degree in the Simiæ.

Body and Limbs.—The body is large, fquare, and robuft; the extremities thick, fhort, and nervous; and the fhoulders high in the Monguls. They are well defcribed in a letter inferted in the Hiftoria Major of Matthew Paris, London, 1686, p. 530, under the name of Tartars (Tatars). "Habent autem Tartari pectora dura et robufta, facies macras et pallidas, fcapulas rigidas et erectas, nafos diftortos et breves, menta proeminentia et acuta, fuperiorem mandibulam humilem et profundam, dentes longos et raros, palpebras a crinibus ufque ad nafum pretenfas, oculos inconftantes et nigros, afpectus obliquos et torvos, extremitates offofas et nervofas, crura quoque groffa, fed tibias breviores, ftatura tamen nobis æquales; quod enim in tibiis deficit, in fuperiori corpore compenfatur."

In the negro the body is more flender, particularly about the loins and pelvis. The dimenfions of the latter cavity are actually fmaller than in the European: in the fkeleton of a negro, twenty years old,

	Inches.	Lines.
The great diameter of the pelvis is -	3	$11\frac{1}{2}$
The fmall ——————— -	3	$7\frac{1}{2}$
In a negro boy of 14, the great diameter is	3	2
——————— fmall ———	2	9
In an European of 16, the great ———	4	3
——————— fmall ———	3	9
In an old European, inferior in ftature to the negro of 20 years, the great -	4	6
——————— the fmall -	3	11

Camper found that the great diameter (from one os innominatum to the other) was to the fmaller (from the facrum to the fymphyfis pubis)

In the negro as -	39	to	$27\frac{1}{2}$
In the European as -	41		27

yet the ftature of the negro exceeded confiderably that of the European. In another European the proportions were as 44 to 28. (See Soemmering über die körperliche Verfchiedenheit, p. 33.) Not only is the cavity fmaller, but the bones compofing it are flenderer: and the circumftance has been noticed by travellers and others.

The fame flendernefs of the trunk may be obferved in fome of the Indians: it is at leaft apparent in the Lafcars, who come to this country with the Eaft India fhips. Their legs are long.

Proportionate Length of the Arm and Fore-arm.—The limbs are fmaller in the negro, and fome differences are obfervable in particular parts. "I meafured," fays Mr. White, "the arms of about fifty negroes, men, women, and children, born in very different climates, and found the lower arm longer than in Europeans, in proportion to the upper arm, and to the height of the body. The firft negro on the lift is one in the Lunatic hofpital at Liverpool; his fore-arm meafures $12\frac{3}{4}$ inches, and his ftature is only 5 feet $10\frac{1}{2}$ inches. I have meafured a great number of white people, from that fize up to 6 feet $4\frac{1}{2}$ inches, and among them one who was faid to have the longeft arms of any man in England, but none had a fore-arm equal to that of the black lunatic.

"I have meafured the arms of a great number of European fkeletons, and have found that the os humeri, or upper arm, exceeds in length the ulna, which is the longer bone of the fore-arm by two or three inches; in none by lefs than two, and in one by not lefs than $3\frac{1}{8}$ inches. In my negro fkeleton, the os humeri is only one inch and one-eighth longer than the ulna. In Dr. Tyfon's Pigmy (fimia fatyrus), the os humeri and ulna were of the fame length; and in my fkeleton of a common monkey, the ulna is $\frac{3}{4}$ of an inch longer than the os humeri." White, on the Regular Gradation, p. 52, et feq.

As the comparifon juft mentioned leads to fome interefting

ing refults, we fubjoin a tabular view of the chief particulars.

	Stature.		Length of os humeri.	Length of ulna.
	Feet.	Inch.	Inches.	Inches.
A female European fkeleton	5	$8\frac{1}{2}$	$12\frac{1}{2}$	10
A male ——— ———	5	8	13	$9\frac{7}{8}$
——— negro fkeleton	4	11	11	$9\frac{7}{8}$
A negro at the Lunatic hofpital, Liverpool	5	$10\frac{1}{2}$	15	$12\frac{3}{4}$
Another from Virginia	5	$5\frac{1}{2}$	$13\frac{1}{2}$	$11\frac{3}{4}$
——— ——— Barbadoes	5	$1\frac{3}{4}$	13	11
Male European -	5	$11\frac{1}{2}$	15	11
——— ——— -	5	8	$13\frac{1}{2}$	$10\frac{1}{2}$
——— ——— -	5	$5\frac{1}{2}$	$13\frac{5}{8}$	$10\frac{1}{4}$
——— ——— -	6	$3\frac{1}{2}$	$15\frac{1}{4}$	$11\frac{3}{4}$
——— ——— -	6	$4\frac{1}{2}$	16	$12\frac{1}{4}$
European woman -	5	4	13	$9\frac{3}{4}$
——— ——— -	5		$12\frac{1}{4}$	$8\frac{3}{4}$
A Lafcar - -	5	4	$12\frac{3}{4}$	$10\frac{1}{2}$
Venus de Medicis -	5		$13\frac{1}{2}$	$9\frac{3}{4}$
Tyfon's chimpanfée -	2	2	$5\frac{1}{2}$	$5\frac{1}{2}$
Monkey - -	2	2	$4\frac{1}{4}$	5

Legs of the Negro, and other Races.—The ancients noticed, what they regarded as defects in the form of the lower limbs in the Egyptians, Ethiopians, and Negro flaves. Soemmering obferves, that the bones of the leg are directed outwards from the knee, fo that the knees appear farther apart, and the feet rather bent outwards: he found the fame circumftance in numerous living negroes. The femur and tibia are flated, both by him and White (who has given a comparative view of the bones of the negro and European leg and foot, pl. 1.), to be more convex in front than in the European. The calves of the leg are very high, fo as to encroach upon the hams. The feet and hands, but particularly the former, are flat; the os calcis, inftead of forming an arch, is continued in nearly a ftraight line with the other bones of the foot, which is remarkably broad. They both terminate in beautiful, but remarkably long fingers and toes, which in that refpect approach to thofe of the monkey; and they all poffeffed, what is not common among Europeans, fefamoid bones. (Von der körperlichen Verfchiedenheit, p. 39.) Unfeemly thicknefs of the legs is not uncommon among the negroes; and the feet are marked with numerous chinks and fiffures, which, as they occur principally in the foles, muft probably be referred to the operation of the burning fands on the epidermis. In the fole of a perfectly healthy negro leg, Blumenbach found this covering "mirum in modum craffa, rimofa, et in multifidas lamellas dehifcens." De Gen. Hum. Var. Nat. p. 246, note *b*.

It has been obferved, that the Indians of the peninfula and the New Hollanders have long and flender limbs; that the Hottentots have meagre bodies and fmall limbs, &c. The crooked legs fo common among the Calmucks, have been affigned to their mode of treating the children, and the practice of riding, to which they are accuftomed from their tendereft years. Pallas uber die Mongolifchen Völkerfchaften, p. 98, tom. i.

The lower limbs are very ill formed in the inhabitants of Terra del Fuego, according to Forfter: he fays that they bear no proportion to the body; that the thighs are meagre and thin, the legs bowed, the knees prominent, the toes turned inwards. Obf. on a Journey round the World.

Ears.—It is well known that the ears ftand off farther from the head, and are moveable in favages, and that the appendix is enlarged and monftroufly elongated by various artificial means in many tribes, particularly in the Eaft Indies and the Pacific. Thefe practices have given rife to the fables of fome older writers concerning the enormous ears of certain people.

Mammæ.—Many travellers have fpoken of the prolix and pendulous mammæ of the females of certain barbarous tribes, particularly in Africa, and in the South fea iflands. We cannot help fufpecting that many of thefe narratives are exaggerated; as, for example, in Hakluyt's Collection, vol. ii. p. 26, where it is faid, that "divers of the women have fuch exceeding long breafts, that fome of them will lay the fame upon the ground, and lie down by them;" in Bruce's Travels, where he fays, that they hang down to the knees in fome of the Shangallas; or in Mentzelius, Befchreibung des Vorgebürges der guten Hoffnung, tom. ii. p. 564, who fays, that purfes are made in great numbers from the breafts of the Hottentot females, and fold at the Cape of Good Hope. It is alfo certain that this conformation is not univerfal in the tribes alluded to, and that many negreffes, who may be feen in the great European emporia, as well as numerous females in the ifles of the Great Pacific (Forfter's Obfervations, &c.), have very beautifully fhaped breafts, and that it exifts alfo in feveral European countries. "I faw," fays Lithgow, "in Ireland's North parts women travayling the way, or toyling at home, carry their infants about their neckes, and laying the dugges over their fhoulders, would give fucke to the babes behinde ther backes, without taking them in their armes: fuch kind of breafts, me thinketh, were very fit to be made money-bags for Eaft or Weft Indian merchants, being more than halfe a yard long, and as well wrought, as any tanner, in the like charge, could ever mollifie fuch leather." (Rare Adventures and Painefulle Peregrinations, p. 433.) An unufually large fize of thefe parts has been obferved in the Morlachian women, by Fortis, (Viaggio in Dalmazia, vol. i. p. 81;) and the Greenland women are faid to fuckle their children at their back.

Long continued fuckling, and the habit of fuckling the children on the back of the mother, feem to be the principal caufes of this ftate of the mammæ. In fome inftances artificial means of elongation have been employed from peculiar notions of beauty.

A large and fwoln ftate of the breaft, is mentioned by Juvenal of the Egyptians, as a well-known fact. "In Meroe craffo majorem infante papillam." The Portuguefe women, of modern days, are faid to be remarkable in the fame way; while the breafts are fmall in the Spaniards, as in the laft century at leaft they took pains to comprefs them in order to prevent too great a luxuriance.

To the difgrace of London, even in this truly pious age of focieties for fuppreffing vice and diftributing bibles, a philofophic foreigner has found in her ftreets a proof of the effects of too early venereal excitement in enlarging the breaft; and has commemorated the fact in a claffical work, which muft convey the fcandal over the whole learned world. "Contraria cura ambitum mammarum augeri poffe nullum dubium eft; quantum vero præterea Venus quoque præmatura eo conferre poffit memorabili fane exemplo impuberes et nondum adultæ puellæ mercenariæ docent quæ Londinum, præfertim ex vicinis maxime fuburbiis, confluunt, et quæftum quæſtum corpore facientes ingenti numero plateas noctu pervagantur." De Gen. Hum. Variet. p. 239.

Organs of Generation.—Negroes are particularly famous for their organs of generation: and ſpecimens preſerved in anatomical cabinets ſeem to juſtify their celebrity for the ſize of theſe parts; but it is doubtful whether this be a general character. The frænum preputii does not exiſt in many of them. White, p. 62.

In the Hottentot women, and in ſome others, the nymphæ are ſaid to form growths of conſiderable ſize (in dactyliformes appendiculas abire); but the former are more celebrated for what has been deſcribed as a natural covering of ſkin, hanging from the abdomen, and hiding the parts of generation. This, with other arguments of equal force, is brought forward by Voltaire, to prove that the Hottentots are not of the ſame ſpecies with Europeans. (Lettres d'Amabed.) Blumenbach, who received from ſir Joſeph Banks, ſeveral views of theſe parts, drawn from the life, informs us that the peculiarity is an artificial elongation of the labia pudendi; in one repreſentation they are 6½ inches long. Le Vaillant's teſtimony is to the ſame effect. Voyage dans l'Inter. de l'Afrique, p. 371. See GENERATION.

Hands and Feet.—Smallneſs of the hands and feet has been mentioned as a character of ſome races, as the Indians, Chineſe, Kamtſchatkans, Eſkimaux, Peruvians, New Hollanders, and Hottentots. "It has been obſerved," ſays Hodges, "of the arms of the Hindoos frequently brought to England, that the gripe of the ſabre is too ſmall for moſt European hands." Travels in India, p. 3.

What art can produce in this way, is ſhewn by the feet of the Chineſe women.

Tranſmiſſion of native Characters to the Children.—Peculiarities of form, like thoſe of colour, are tranſmitted to the offspring; and this principle prevails ſo generally, that even thoſe minute, and to our ſenſes entirely imperceptible differences of organization or vital properties, which render men diſpoſed to particular diſeaſes, are conveyed from father to ſon for age after age. Hence we ſee a general reſemblance in perſons of the ſame blood, and may frequently obſerve a peculiar feature running through a whole family. The thick lip introduced into the imperial houſe of Auſtria by the marriage of Maximilian to Mary of Burgundy, is viſible in their deſcendants to this day. In ſmall and ſecluded communities, where marriages take place within what we may regard only as a more extenſive family, hereditary varieties are blended, and produce one form, which prevails through the whole circle. The operation of this principle may be clearly perceived in ſeveral ſmall diſtricts: it will act with more efficacy, and conſequently be more diſcernible, in larger collections of men, where differences of manners, religion, and language, and mutual animoſities, forbid all intermarriages with ſurrounding people. In the courſe of time the individual peculiarities are loſt, and a natural characteriſtic countenance or form is eſtabliſhed, which, if the reſtrictions of intercourſe are rigidly adhered to, is conſtantly more and more ſtrengthened. The ancient Germans, according to the deſcription of Tacitus, were ſuch a people, and his ſhort, but expreſſive ſketch of their character, moſt aptly confirms the preceding view: "Ipſe eorum opinionibus accedo, qui Germaniæ populos nullis aliis aliarum nationum connubiis infectos, propriam & ſinceram, et tantum ſui ſimilem gentem exſtitiſſe arbitrantur. Unde habitus quoque corporum, quanquam in tanto hominum numero, idem omnibus; truces & cærulei oculi, rutilæ comæ, magna corpora." De Morib. Germ. 4. The gipſies afford another example of a people ſpread over all Europe for the laſt four centuries, and nearly confined in marriages to their own race, by their peculiar way of life. In Tranſylvania, where there is a great number of them, and the race remains perfectly pure, their features can conſequently be more accurately obſerved: in every country and climate, however, which they have inhabited, they preſerve their diſtinctive character ſo perfectly that they are recognized at a glance, and cannot be confounded with the natives: ſee the deſcription and figure of the cranium of a Tranſylvanian Gipſey, in Blumenbach, Decas Altera, p. 3. But, above all, the Jews exhibit the moſt ſtriking inſtance of a peculiar national countenance, ſo ſtrongly marked in almoſt every individual, that perſons the leaſt uſed to phyſiognomical obſervations detect it inſtantly, yet not eaſily underſtood or deſcribed. Religion has, in this caſe, moſt ſucceſsfully exerted its power in preventing communion with other races; and this excluſion of intercourſe with all others has preſerved the Jewiſh countenance ſo completely in every ſoil and climate of the globe, that a miracle has been thought neceſſary to account for the appearance.

In what other way can we explain the difference between the Engliſh and Scotch? Would it be more reaſonable to ſuppoſe that they deſcended from different ſtocks; or to aſcribe the high cheek bones of the latter to ſoil or climate?

Alteration of Form by Breeding.—As, on the one hand, a particular form may be perpetuated by confining the intercourſe of the ſexes to individuals in whom it exiſts; ſo, again, it may be changed by introducing into the breed thoſe remarkable for any other quality. Connections in marriage will generally be formed on the idea of human beauty in any country; an influence this, which will gradually approximate the countenance towards one common ſtandard. If men, in the affair of marriage, were as much under management as ſome other animals, an abſolute ruler might accompliſh, in his dominions, almoſt any idea of the human form. The great and noble have generally had it more in their power than others to ſelect the beauty of nations in marriage; and thus, while, without ſyſtem or deſign, they gratified merely their own taſte, they have generally diſtinguiſhed their order, as much by elegant proportions of perſon, and beautiful features, as by its prerogatives in ſociety. "The ſame ſuperiority," ſays Cook, "which is obſervable in the Erees or nobles in all the other iſlands, is found alſo here (Owhyhee.) Thoſe, whom we ſaw, were, without exception, perfectly well formed; whereas, the lower ſort, beſides their general inferiority, are ſubject to all the variety of make and figure that is ſeen in the populace of other countries." (Third Voyage, book iii. chap. 6.) In no inſtance, perhaps, has the perſonal beauty of a people been more improved, by introducing handſome individuals to breed from, than in the Perſians, of whom the nobility have, by this means, completely ſucceeded in waſhing out the ſtain of their Mongolian origin. "That the blood of the Perſians," ſays Chardin, "is naturally groſs, appears from the Guebres, who are a remnant of the ancient Perſians, and are an ugly, ill-made, rough-ſkinned people. This is alſo apparent from the inhabitants of the provinces in the neighbourhood of India, who are nearly as clumſy and deformed as the Guebres, becauſe they never formed alliances with any other tribes. But, in the other parts of the kingdom, the Perſian blood is now highly refined by frequent intermixtures with the Georgians and Circaſſians, two nations which ſurpaſs all the world in perſonal beauty. There is hardly a man of rank in Perſia, who is not born of a Georgian or Circaſſian mother; and even the king himſelf is commonly ſprung, on the female ſide, from one or other of theſe countries: as it is long

ſince

ſince this mixture commenced, the Perſian women have become very handſome and beautiful, though they do not rival the ladies of Georgia. The men are generally tall and erect: their complexion is ruddy and vigorous, and they have a graceful air, and an engaging deportment. The mildneſs of the climate, joined to their temperance in living, has a great influence in improving their perſonal beauty. This quality they inherit not from their fathers; for, without the mixture mentioned above, the men of rank in Perſia, who are deſcendants of the Tartars, would be extremely ugly and deformed." Voyage en Perſe, &c. tom. ii. p. 34.

The tranſmiſſion of natural peculiarities, by generation, is remarkably illuſtrated by ſome inſtances of unuſual formation: ſuch is the family of the porcupine men, and of the ſix-fingered and ſix-toed perſons, both produced from individuals of the common form. (See, for the former, the article MONSTER, and for the latter, GENERATION.) There is no reaſon to doubt, that if the individuals, with theſe peculiarities, had been carefully matched together, that a permanent variety might have been eſtabliſhed.

Let us ſuppoſe that the porcupine family had been exiled from human ſociety, and obliged to take up their abode in ſome ſolitary ſpot, or deſert iſland; by matching with each other a race would have been produced, more widely removed from us in external appearance than the negro. If they had been diſcovered at ſome remote period, our philoſophers would have explained to us how the ſoil, air, or climate, had produced ſo ſtrange an organization; or would have demonſtrated that they muſt have ſprung from an originally different race: for who would acknowledge ſuch briſtly beings for brothers?

We learn that the giants, collected with ſuch pains by Frederic William I. for his regiment of guards, produced, in a town of Germany, where they were quartered, a very tall race of men: in the language of Dr. Johnſon, they "propagated procerity."

Correſponding Varieties in Animals.—There is none of the varieties above enumerated, which does not not exiſt in a ſtill greater degree in animals confeſſedly of the ſame ſpecies. What differences in the figure and proportion of parts in the various breeds of horſes; in the Arabian, the Barb, and the German! How ſtriking the contraſt between the long-legged cattle of the Cape of Good Hope, and the ſhort-legged of England! The ſame difference is obſerved in ſwine. The cattle have no horns in ſome breeds of England and Ireland; in Sicily, on the contrary, they have very large ones. A breed of ſheep, with an extraordinary number of horns, as three, four, or five, occurs in ſome northern countries, and is accounted a mere variety (ovis polycerata); the Cretan breed of the ſame animal, has long, large, and twiſted horns. We may alſo point out the ſolidungular ſwine, with undivided hoof, as well as others, with three diviſions of that part; the five-toed fowl (gallus pentadactylus); the broad-tailed ſheep of Tatary, Thibet, &c. in which the tail grows ſo large that it is placed on a board, ſupported by wheels, for the convenience of the animal; and the rumpleſs fowl (gallus ecaudatus), of America, and particularly Virginia, which has undoubtedly deſcended from the Engliſh breed.

The common fowl, in different ſituations, runs into almoſt every conceivable variety. "E volucribus altilibus varietatum numero et inſigni diſcrepantia certe eminent gallinæ. Habentur magnæ, minutæ, proceræ, pumiliones, criſtarum parvitate vel multiplicitate, aut thiaris plumaceis inſignes, uropygio carentes, flavipedes, plumipedes; habentur toto corpore reverſis plumis hirſutæ; immo in India naſcitur varietas, plumis lanuginoſis albis veſtita, et cute per totum corpus nigra. Et hæ omnes, exceptis Indicis, innumera colorum diverſitate ludunt." Pallas, Spicileg. Zool. faſc. 4.

The formation of new varieties by breeding from individuals, in whom the deſirable properties exiſt in the greateſt degree, is ſeen much more diſtinctly in our domeſtic animals, than in our own ſpecies, ſince the former are entirely in our power. The great object is to preſerve the race pure, by ſelecting for propagation the animals moſt conſpicuous for the ſize, colour, form, proportion, or any other property we may fix on, and excluding moſt carefully all others. In this way we may gain ſheep valuable for their fleece, or for their carcaſe; large or ſmall; with thick or thin legs; juſt ſuch, in ſhort, as we chuſe, within certain limits. (See BREEDING and CATTLE.) The importance of this principle is fully underſtood in rearing horſes and cocks. The Arabian preſerves the pedigree of his horſe more carefully than his own, and never allows any ignoble blood to be mixed with that of his valued breeds: he atteſts their unſullied nobility by formal depoſitions and numerous witneſſes. (See Buffon on the Horſe.) The Engliſh breeder knows equally well that he muſt vary his ſtallions and mares according as he wiſhes for a cart horſe, a riding horſe, or a racer; and that a miſtake in this point would immediately fruſtrate his views. Blood is equally important in the cock; and the introduction of an inferior individual would inevitably deteriorate the properties of the offspring.

Stature.—No part of our ſubject has been more diſgraced by fables and hyperbolical exaggeration than the preſent diviſion. Not to mention the pigmies and giants of antiquity; the bones of different large animals, aſcribed to human ſubjects of immoderate ſtature, even by ſuch men as Buffon, ſufficiently prove our aſſertion. The accuracy of modern inveſtigation has, however, ſo completely expoſed the extravagance of ſuch ſuppoſitions, that we are relieved from the neceſſity of a detailed conſideration. All the remains of antiquity, which afford us any inferences on the ſubject of ſtature, ſuch as mummies, human bones, and particularly teeth taken from the oldeſt burial places and urns, armour, &c. concur in proving that the ancients did not exceed the moderns in this reſpect. Yet amongſt the latter there are obvious national differences. Of European nations ſome parts of Sweden and Switzerland are diſtinguiſhed for tallneſs, as Lapland is in the contrary reſpect. The Abipons in the new world are of large ſize, and the Eſquimaux ſmall; but neither are very remarkable: and there is no difference between any two modern nations, but what admits of eaſy explanation from the common cauſes of degeneration, and the analogous phenomena furniſhed by the natural hiſtory of other animals.

The Patagonians (ſo called from its being ſuppoſed that they were allied to a neighbouring people, the Chonos, and from their reſembling hairy-footed animals, called in Spaniſh Patas, through their practice of wearing the rough ſkin of the guanaco) or, according to their own indigenous name, the Tehuels, which occupy the ſouth-eaſt part of the extremity of South America, ſeem to be the talleſt of the human race; but their height has been much exaggerated. Pigafetta, who accompanied Magalhaens on his voyage round the world, aſſerted that they were twice as tall as Europeans, (Viaggio atorno il Mondo, in the collection of Ramuſio, vol. i.) From that time for two centuries and a half, the narratives of European voyages into that part of the world, are ſo ſtrangely contradictory and inconſiſtent with each other, on the ſubject of theſe Patagonians, that they afford a leſſon inculcating moſt ſtrongly the neceſſity of caution and diffidence in employing such reports. Blumenbach cites ten authors in illustration of this point (De Varietate p. 255). It is sufficient, for our present purpose, to represent what appears the most probable state of the case, after weighing and critically considering the most unexceptionable testimonies. They seem in truth to be a tall, though not gigantic race, and to possess a remarkably muscular frame. Thus at least they are represented by the most respectable observers. The only Patagonians ever seen in Europe, were brought to Spain towards the end of the 16th century, and seen at Seville by the truly classical traveller Van Linschoten, who says that they were "well formed and large in the body," (wel gestatueert ende grof van leden) The variety in the statements makes it difficult to assign any particular height; but they probably do not exceed six feet six inches English. Bougainville says that none were under five feet six inches, and none over five feet eleven inches, (Paris measure, of which the foot is to that of England as 144 to 135.) (Voy. autour du Monde, 4to. p. 126.) Commerson, however, makes some of the highest six feet four inches (French). Journal Encyclopedique, 1772.) Byron represents them as seven feet high; but he did not measure them: (Hawkesworth's Collection, vol. i. p. 28.) Wallis, who measured them carefully, found the general stature to be six feet, (Ibid. p. 374;) and the statement of Carteret coincides with this; Phil. Transact. vol. lx. The stature we have assigned to these people is not so very remarkable, since other native tribes of the same continent have been noticed for their height: for example, the Caribs of Cumana, seen by Humboldt. As they are a wandering race, we cannot be surprised at finding that Europeans visiting the coast have not always been able to see them. The accounts of travellers prove, that the height of the Patagonians is not a peculiar circumstance. Bartram represents the Muscogulges and Cherokees of North America, inhabiting between 31° and 35′ of North latitude, as taller than Europeans; many being above six feet, and few under five feet eight or ten inches. (Travels, p. 482.) The Caffres, according to Barrow, are "tall, robust, and muscular, and distinguished by a peculiar firmness of carriage; some of them were six feet ten inches, and so elegantly proportioned that they would not have disgraced the pedestal of the Farnese Hercules. We may perhaps regard the Patagonians, like the antient Germans, as a peculiar and genuine race, not modified or disturbed by intermixture with others. Large body and limbs, as well as undaunted courage, were the attributes of this people, according to Pomponius Mela; "immanes animis & corporibus," lib. iii. cap. 3. Cæsar and Tacitus corroborate this statement. By collecting and comparing all the notices concerning them in the writers of antiquity, we should be warranted in assigning to them a height of six feet three inches and a half (French), which at least equals the stature of the Tehuels. The Laplanders and Nova Zemblians in Europe, the Samoieds, Ostiacs, Yakuts, and Tungooses in Asia, and the Greenlanders and Esquimaux of America, all, in short who inhabit high northern latitudes, are short in stature, measuring from four to five feet; and they agree remarkably in other characters, although occupying such distant countries. It seems rather doubtful whether the miserable Pescherais, who wander naked over the rocks of Terra del Fuego, are also diminutive; but Barrow informs us that the Boshmen who adjoin the Cape, scarcely ever exceed four feet nine inches.

The nation of dwarfs in the interior of Madagascar, called Quimos or Kimos, seems to be only an exaggeration founded on the observation of a morbid individual. Commerson mentions that he measured one who was only three feet eight inches. (Journal Encyclopedique 1772.) It appears that the captain of the ship purchased a poor pallid dwarf, whose hands reached to her knees. That she had a head disproportionately large, uttered only indistinct sounds, and was quite stupid. From these circumstances Blumenbach conjectures that it was a case of Cretinism, and similar to the instances in Salzburg, the Valais, and particularly in Piedmont. De Variet. p. 261. Handbuch der Naturgeschichte, p. 65.

Every one will immediately perceive that the differences of stature in the human race are not equal to those occurring in different breeds of animals. The pigs taken from Europe into the island of Cuba have grown to twice their original size; and the cattle in Paraguay have experienced a great increase in this respect. Clavigero, Storia antica del Messico, t. iv. p. 142.

It is hardly necessary for us to mention the contrast between the small Welch and the huge cart horses, or the Flanders breed of these animals; and between the Welch and Holstein cattle. The Paduan fowl is twice the size of the common breed. Buffon, vol. xii. p. 112.

Fabulous Varieties.—Nations with bodies of variously monstrous configuration, as the Arimaspi with one eye, the Monosceli with one leg, the Cynomolgi with dogs' heads, &c. have been enumerated by cosmographers from the time of Herodotus, from various authorities, particularly Aristeus, Ctesias and Megasthenes. See J. A. Fabricius de Hominibus nostri Orbis Incolis, Hamb. 1721, 4to. It is not necessary to dwell on these fables, although we should probably find, as in other instances in natural history, that they consist of some truth, either hyperbolically exaggerated, or changed by absurd misrepresentation. We shall only speak of one out of this mass of prodigies, *viz.* the men with tails who have been again and again noticed by many authors of very different ages. Their last patron was lord Monboddo, in his Origin and Progress of Language, v. i. p. 234, and Antient Metaphysics, v. iii. p. 250.

Pliny in the first instance, and after him Ptolemy and Pausanias, speak of a nation in India with tails: we meet with them again in the middle ages in the Nubian Geographer; in Marco Polo the Venetian, and others: in more recent times such men are mentioned in the islands of the Indian archipelago, in some provinces of Russia, and in other places. Most of these accounts are derived from others, and not from ocular testimony; most of the reporters obviously deserve very little credit (the work of the Swede, for instance, who speaks of the tails of the Nicobar people, and is mentioned as a narrative "summæ fidei" in a letter of Linnæus to lord Monboddo, is characterised by Blumenbach as "ineptarum fabellarum plenissima"); and they differ most marvellously from each other (three eyewitnesses, who speak of the tails of the Formosans give quite different descriptions, see Blumenbach de Variet. p. 269, note *m.*) On the other hand the most intelligent and accurate travellers either make no mention of the prodigy, or else characterize it as a pure fiction. Some indeed have shewn what has given rise to the statement, as a pendulous portion of the dress in the Nicobar isles, see Fontana in the Asiatic Researches, v. iii. p. 151; or the mistake of a figure of a tailed and anthropomorphous simia. Blumenbach traced the engraving of such an animal through various authors, each of whom made it a little more human, until it was metamorphosed into the representation of a homo caudatus. Martini in his version of Buffon took a plate from the Amœnitates of Linnæus, who took it from Aldrovandus, who took it from Gesner, who took it from a German description of the Holy Land, (Reyss in das gelobte land. Mentz, 1486,) in which it represents a quadrumanous

manous monkey, which, with other exotic animals, was feen in the journey. (De Variet. p. 271, note p.) Thus, inftead of having any race of men with tails authenticated by credible witneffes, there is no example even of a fingle family difplaying fuch an anomaly, although there are many well-known inftances of families with fix fingers.

Monftrous Varieties.—Thefe occur only in individual inftances, and are probably to be regarded as pathological phænomena: their defcription is referred altogether to the article MONSTER.

Faculties of the Mind; and moral Feelings.—The different progrefs of various nations in general civilization, and in the culture of the arts and fciences, the different characters and degrees of excellence in their literary productions, their varied forms of government, and many other confiderations, muft convince us beyond the poffibility of doubt, that the races of mankind are no lefs characterized by diverfity of mental endowments, than by thofe differences of organization, which we have already enumerated and confidered. Such however has been the effect of education, of laws, of peculiar habits and cuftoms, and of the different forms of government in modifying the mind and character of men, that we can hardly now difcern what fhould be afcribed to original difference, and what fhould be referred to the operation of thefe external caufes. That climate will exert a powerful influence on the mind may be very reafonably expected; and it has an analogous influence on the animal creation. We are informed, that the dog in Kamtfchatka, inftead of being faithful and attached to his mafter, is malignant, treacherous, and full of deceit. He does not bark in the hot parts of Africa nor in Greenland; and in the latter country lofes his docility fo as not to be fit for hunting.

Yet, without denying that there are differences both in the extent and kind of mental power, we are decidedly of opinion that thefe differences are not fufficient in any inftance to warrant us in referring a particular race to an originally different fpecies; and we proteft efpecially againft the fentiments of thofe, who would either entirely deny to the Africans the enjoyment of reafon; or who afcribe to them fuch vicious, malignant, and treacherous propenfities as would degrade them, even below the level of the brute. It can be proved moft clearly, and the preceding obfervations will fuffice for this purpofe, that there is no circumftance of bodily ftructure fo peculiar to the Negro, as not to be found alfo in other far diftant nations; no character which does not run into thofe of other races, by the fame infenfible gradations as thofe which connect together all the varieties of mankind. We cannot but admire the reafoning and humanity of thofe, who, after tearing the African from his native foil, carrying him to the Weft Indies, and dooming him there to perpetual labour, complain that his underftanding fhews no figns of improvement, and that his temper and difpofition are incorrigibly perverfe, faithlefs, and treacherous. Let us however obferve him in a fomewhat more favourable ftate than in thofe dreadful receptacles of human mifery, the crowded decks of the flave-fhip, or in the lefs openly fhocking, but conftrained and extorted, and therefore painful, labours of the fugar plantation. That the negroes are much like Europeans, and behave to others according to the treatment which they receive, may be eafily gathered from the beft fources of information. They have not indeed reached that fublime height, the "beau idéal" of morality, the returning good for evil, probably becaufe their mafters have not yet found leifure enough from the purfuit of riches to inftil into them the true fpirit of Chriftianity. "The feelings of the Negroes are extremely acute. According to the manner in which they are treated, they are gay or melancholy, laborious or flothful, friends or enemies. When well fed, and not mal-treated, they are contented, joyous, ready for every enjoyment; and the fatisfaction of their mind is painted in their countenance. But, when oppreffed and abufed, they grow peevifh, and often die of melancholy. Of benefits and abufe they are extremely fenfible, and againft thofe who injure them they bear a mortal hatred. On the other hand, when they contract an affection to a mafter, there is no office, however hazardous, which they will not boldly execute, to demonftrate their zeal and attachment. They are naturally affectionate, and have an ardent love for their children, friends, and countrymen. The little they poffefs they freely diftribute among the neceffitous, without any other motive than that of pure compaffion for the indigent." Hift. des Antilles, p. 483.

The travels of Barrow, le Vaillant and Mungo Park, abound with anecdotes honourable to the moral character of the Africans, and proving that they betray no deficiency in the amiable qualities of the heart. One of thefe gives us an interefting portrait of the chief of a tribe: "His countenance was ftrongly marked with the habit of reflection; vigorous in his mental, and amiable in his perfonal qualities, Gaika was at once the friend and ruler of a happy people, who univerfally pronounced his name with tranfport, and bleffed his abode as the feat of felicity." Many highly polifhed European kings would appear to little advantage by the fide of this favage. We fee no reafon to doubt that the negroes, taken altogether, are not inferior to any variety of the human race in natural goodnefs of heart. It is confonant to our experience of mankind in general, that the latter quality fhould be deadened or completely extinguifhed in the flave fhip or the plantation: indeed it is as little creditable to the head as to the heart of their white tormentors to expect affection and fidelity from flaves after fuch treatment.

The acute and accurate Barbot, in his large work on Africa, fays, "The blacks have fufficient fenfe and underftanding, their conceptions are quick and accurate, and their memory poffeffes extraordinary ftrength. For, although they can neither read nor write, they never fall into confufion or error in the greateft hurry of bufinefs and traffic. Their experience of the knavery of Europeans has put them completely on their guard in tranfactions of exchange; they carefully examined all our goods, piece by piece, to afcertain if their quality and meafure are correctly ftated; and fhew as much fagacity and clearnefs in all thefe tranfactions, as any European tradefman could do." Of thofe imitative arts, in which perfection can be attained only in an improved ftate of fociety, it is natural to fuppofe that the Negroes can have but little knowledge; but the fabric and colours of the Guinea cloths are proofs of their native ingenuity; and, that they are capable of learning all kinds of the more delicate manual labours, is proved by the fact, that nine-tenths of the artificers in the Weft Indies are Negroes: many are expert carpenters, and fome watch-makers. The drawings and bufts executed by the wild Bofhman in the neighbourhood of the Cape are praifed by Barrow for their accuracy of outline, and correctnefs of proportion.

Inftances are by no means rare, of negroes, who have diftinguifhed themfelves in literature and the arts, when favoured by fortune with opportunities of education and improvement. In proof of their mufical talents, it may be mentioned that they have been known to earn fo much in America, as to purchafe their freedom with large fums. The younger Freidig in Vienna was an excellent performer both on the violin and violoncello; he was alfo acapital draftfman, and had made a very fuccefsful painting of himfelf.

The

The capacity of the negroes for the mathematical and phyfical fciences, is proved by Hannibal, a colonel in the Ruffian artillery, and Liflet of the ifle of France, who was named a correfponding member of the French academy of Sciences, on account of his excellent meteorological obfervations. Fuller of Maryland was an extraordinary example of quicknefs in reckoning. Being afked in a company, for the purpofe of trying his powers, how many feconds a perfon had lived who was 70 years and fome months old, he gave the anfwer in a minute and a half. On reckoning it up after him, a different refult was obtained ; have not you forgotten the leap years ? fays the negro. This omiffion was fupplied, and the number then agreed with his anfwer.

Boerhaave and De Haen have given the ftrongeft teftimony that our black brethren poffefs no mean infight into practical medicine ; and feveral have been known as very dextrous furgeons. A negrefs at Yverdun is mentioned by Blumenbach as a celebrated midwife of real knowledge and a fine experienced hand.

Omitting Madocks a methodift preacher, and not attempting to enumerate all the negroes who have written poems, we may mention that Blumenbach poffeffes Englifh, Dutch, and Latin poetry by different negroes. In 1734, A. W. Amo, an African, from the coaft of Guinea, took the degree of doctor in philofophy at the univerfity of Wittemberg. Two of his differtations, according to Blumenbach, exhibit much well digefted knowledge of the beft phyfiological works of the time. In an account of his life, publifhed at the time, by the academic council, his integrity, talents, induftry, and erudition, are very highly commended.

Jac. Eliza Joh. Capitein, who was bought by a flave dealer, when eight years old, ftudied theology at Leyden, and publifhed feveral fermons and poems ; his "Differtatio de Servitute Libertati Chriftianæ non contraria," went through four editions very quickly. He was ordained in Amfterdam, and went to Elmina on the Gold coaft, where he was either murdered, or exchanged for the life and faith of his countrymen thofe he had learned in Europe.

Ignatius Sancho, and Guftavus Vafa, the former born in a flave fhip on its paffage from Guinea to the Weft Indies, and the latter in the kingdom of Benin, have diftinguifhed themfelves as literary characters in this country in modern times ; their works and lives are fo well known, and fo eafily acceffible, that it is only neceffary for us to mention them.

Blumenbach, from whofe "Beyträge zur Naturgefchichte," the preceding inftances are taken, farcaftically obferves, that entire and large provinces of Europe might be named, in which it would be difficult to meet with fuch good writers, poets, philofophers, and correfpondents of the French academy ; and, on the other hand, that there is no favage people, which have diftinguifhed themfelves by fuch examples of perfectibility and even capacity for fcientific cultivation ; and confequently that none can approach more nearly to the polifhed nations of the globe, than the negro, p. 118.

The opportunities of obfervation, that fall to the lot of any individual, are fo limited, and the remarks of travellers and hiftorians fo likely, from various caufes, to be perverted by ignorance or mifreprefentation, that it muft be very difficult to produce any thing fatisfactory on the fubject of the general characters of the various races in intellect, difpofition, &c. We prefent therefore to the reader the conclufions which are drawn by Meiners, from an immenfe collection of authorities.

"Providence beftowed on the white and handfome races, not only confiderable prerogatives of bodily ftructure, but alfo of mental power ; connecting however neither of them with the fineft climates. The ancients obferved that the moft fruitful countries weakened the powers of the mind and the manly virtues. The favourable influence of climate on the intellect cannot be denied ; and it is equally true that the nobleft natures would be unavoidably corrupted and degraded in certain fituations. The moft dangerous are certain fpots on the coaft of Africa, Egypt, Hindooftan, the fouthern Afiatic kingdoms, particularly Siam, China, and feveral iflands, the Weft Indies, and various fpots in South America. An almoft incredible acutenefs of the external fenfes, which feems a gift of nature, is found in the dark and ugly nations. Among favages, as well as among the civilized, remarkable examples occur of men, who are not moved by the moft violent impreffions, and yet cannot bear the mildeft perfume. In the ugly nations, an almoft entire infenfibility to beauty of form, order, and harmony, is united to the greateft acutenefs of the fenfes. It feems that their imagination has a peculiar turn, which does not exift in the handfome nations.

The whole divifion of the ugly and dark coloured people is far below the white and handfome ones in the faculties of the mind ; yet there are confiderable differences between the various races in both. In Afia the Burates are the moft ftupid ; the Calmucks are more docile ; and fome fouthern people, as thofe of Pegu, the Malays, Chinefe, and Japanefe are much more fo. This want of talents affects alfo the lower cafts of the Hindoos. The original inhabitants of America poffefs ftill lefs intellect than the Mongolian tribes of Afia, and this is an incontrovertible proof that climate may rob the human race of genius and virtue. The ftupidity of the Americans was fo ftriking, and fo generally known, that there was fome trouble to convince the Spaniards that they were men, and capable of becoming chriftians ; yet thefe very Americans difplay, in certain points, a capability of learning, by which they exceed the moft ingenious Europeans. The negroes indeed come above the Americans ; but they are nearer to them than to the Europeans. Of the white people, the Celtic race has been much more richly endowed by nature, than the Slavonic or Oriental.

The dark people are again diftinguifhed from the fair by a deplorable abfence of virtues, and by feveral frightful exceffes. With an irritability arifing from weaknefs, and an incredible fenfibility to the flighteft affronts, the black nations combine an aftonifhing infenfibility of the pains and joys of others, even their neareft relations, inflexible cruelty, felfifhnefs and difpofition to cheat, and a want of all fympathetic impulfes and feelings. With more than female cowardice, and fear of open approaching danger and death, they join inconceivable calmnefs and indifference under the moft horrible tortures, difeafes, and actual death ; with want of affection towards their own children, an extraordinary degree of tendernefs to animals, even the moft difgufting vermin ; with brutal obfcenity, voracity, and fhamelefsnefs, either an immoderate attachment to fenfual love, or the greateft coldnefs, and confequent contempt of the female fex. Exceffive irritability is found in all the Finnic races of Afia and America. The Burates are the worft of all thefe favages, and are confiderably excelled by the Tungoofes, the Calmucks and Monguls, the Coriacks, the Tfchutfki, the Kuriles, and particularly the Japanefe. The Kamtfchatkans are more contemptible, but lefs cruel than the Laplanders. The Chinefe are one of the moft worthlefs people in Afia, and are exceeded in integrity at leaft, if in no other refpect, by the Tunquinefe, Siamefe and Hindoos. The Malays, and moft of the people who defcend from them, are feared, not only by the Afiatics, but even by the Europeans. The fouls of the blacks in New Guinea, New

 Holland,

Holland, &c. are not lefs ugly than their bodies; on the contrary, the difpofition alone of the inhabitants of the Nicobar and Bally iflands would prove that they are of more noble origin than their neighbours. The worthlefsnefs or corruption of human nature is no where more univerfal, or has been more accurately obferved, than in the Americans, the portraits of whom, fill the friend of humanity, by turns, with pity, horror, and indignation. The difpofitions of the negroes are as different as their defcent; hence the contradictory defcriptions of their manners. Even the flave dealers fix their prices, not merely according to the bodily powers, but in proportion to the docility and good difpofitions of their commodity. The worft negroes of Malabaric origin are the Jiagas, the Anzicos, thofe of Dahomey, and the Gallas, which, as well as all their black brethren, bear a remarkable refemblance in difpofition to the Americans.

"The white and handfome nations may degenerate and be reduced to a ftate of barbarifm by phyfical and moral caufes, as we learn from the examples of the Greeks and Romans, of the modern inhabitants of Caucafus and almoft all the European colonies in the torrid zone. But they have diftinguifhing prerogatives in their wildeft ftate, as a comparifon of the ancient Germans, Spaniards, Scandinavians, and Scythians, and of the modern Highland Scotch, and other Celtic people, with the African and American favages, will moft abundantly prove. The Celtic people alone have poffeffed true bravery, love of liberty, and other paffions and virtues of great fouls. They alone have been as generous and mild towards the weak and the vanquifhed, as terrible to their enemies; and have conftantly treated conquered nations and the female fex very differently from the Mongolians. Moft of the virtues, which adorn and ennoble man, have exifted from early times in a higher degree among the Celtic than among the Slavonic and Oriental people. The white people are neither fo debauched, nor fo cold, nor fo much addicted to unnatural enjoyments as the dark coloured. On the other hand, the Slavonics and Orientals have a much ftronger attachment to fenfual love than the Celts; and of the latter, the fouthern are more fenfual than the northern. Some favages indeed have conceived themfelves fuperior to Europeans; but, in general, they have acknowledged the excellence of thefe more noble races, and this confeffion is moft plainly implied in the practice of offering their wives and daughters to better men, and in the attachment and fidelity, which the women of the ugly nations difplay towards the more powerful Europeans, in preference to the men of their own race." Meiners, Grundrifs, p. 111. 128.

Caufes of the Varieties of the Human Species.—The caufes which operate on the bodies of living animals, either modify the individual, or alter the offspring. The former are of great importance in the hiftory of animals, and produce very aftonifhing alterations in their nature; but the latter are the moft powerful, affect the fpecies, and create the diverfities of race or breed

Climate.—That climate will exert a very powerful influence on all organized bodies, and particularly on warm blooded animals, muft naturally be expected, when we confider how conftantly and completely thefe animals are expofed to the action of the atmofphere in which they live; how wonderfully the compofition of this air, formerly fuppofed to be a fimple element, varies, not only in its gafeous ingredients, but alfo in the acceffory ones of light, heat, electricity, &c.; and what a variety of other circumftances is to be taken into confideration, as the geographical pofition of different countries, their elevation, mountains, rivers, vicinity to the fea, prevailing winds, &c. Let it be further remembered, that the blood expofed to this air in the cheft muft be varioufly changed according to its compofition and nature, and thus that the fecretions, as well as the function of nutrition, of which the materials are derived from this fluid, muft be greatly influenced.

Although this confiderable and conftant operation of climate on the animal economy, and the habit and form of the body has been noticed by attentive obfervers in all ages, it is rather difficult to define precifely what ought to be attributed to this caufe only, and what arifes from the other fources of degeneration, or from their concourfe. We fhall ftate one or two changes, which feem to depend unequivocally on this caufe.

The whitening (blanching or etiolation) of vegetables, when the fun's rays are excluded, demonftrates the agency of thofe rays on vegetable colours. In the fame way, men who are much expofed to the air acquire a deeper tint in their fkin than thofe who are more covered; and the tanning of the fkin by the fummer fun in parts of the body expofed to it, as the face and hands, is a phenomenon completely analogous. The ruddy and tawny hues of thofe who live in the country, and the pale fallow countenances of the inhabitants of towns owe their origin to this caufe. Men of the fame race are lighter or darker coloured according to the climate which they inhabit; the Moors, in their native colour, are not darker than the Spaniards, French, nor moft of the Englifh; but their acquired tint is fo much deeper, that we diftinguifh them inftantly. How fwarthy do the Europeans become, who feek their fortunes under the tropics and equator, and have their fkins parched by the burning funs of "Afric and of either Ind."

The white colour, in the northern regions, of many animals which poffefs other colours in more temperate climates, as the fox, the hare, beafts of burden, the falcon, crow, jackdaw, chaffinch, &c. feems to arife entirely from climate. This opinion is ftrengthened by the analogy of thofe animals, which change their colour, in the fame country at the winter feafon, to white or grey, as the ermine and weafel, hare, fquirrel, rein deer, white game (tetrao lagopus), fnow bunting (emberiza nivalis), &c. Linnæus Flora Lapponica; edit. of Smith, p. 55. 352. The common bear is differently coloured in different countries.

That the coverings of animals, as well as their colour, are much influenced by climate, is evinced in many inftances. The fheep in Africa has a coarfe hair fubftituted in the place of its wool; and the dog lofes its coat entirely, and has a fmooth and foft fkin. The wool of the fheep is thicker and longer in the winter, and in hilly northern fituations, than in the fummer, and on warm plains. Much benefit is derived, in the cultivation of this animal, by changing its paftures according to the feafons of the year, and protecting it from the feverity of the climate. The influence of various caufes, which may be comprehended under the general term of cultivation, is very ftriking in the fheep and goat; the great difference in the wool produced from the former, under various circumftances, is well known; and a perfon, who was acquainted with the covering of the goat in European climates, would hardly believe it poffible that the material from which the precious fhawls of Cafhmere are manufactured, could be produced from the fame animal.

Whether the long and filky coat of the goat, cat, fheep, and rabbits of Angora can be afcribed to the climate, we do not know; it is at leaft worthy of notice that this quality of the hair fhould exift in fo many animals. It continues when they are removed into other countries, and is tranfmitted to the offspring; fo that we may probably regard thefe animals as permanent breeds.

Muft

Muſt we not refer to climate the conſtant and remarkable degeneracy of the horſe in France. "In France," according to Buffon, "Spaniſh or Barbary horſes, when the breed is not croſſed, become French horſes, ſometimes in the ſecond generation, and always in the third." V. iv. p. 106.

Food.—We naturally expect that food will produce conſiderable changes in the living body; its effect ſeems to be proved by the well known fact that ſeveral ſinging birds, chiefly of the lark and finch kinds, become gradually black, if they are fed on hempſeed only. (Blumenbach, de Variet. p. 94.) The texture of the hair has been changed, in an African ſheep brought into England, from the coarſe nature of that of the camel, to conſiderable fineneſs and ſoftneſs, by one year's feeding in the paſtures of this country. The influence of the ſame cauſe on the ſtature and proportion of the body is ſhewn in the horſe, which grows to a large ſize in the marſhy grounds of Frieſland, while on ſtony ſoils, or dry heaths, they remain dwarfiſh. Oxen become very large and fat in rich ſoils, but are diſtinguiſhed by ſhortneſs of the legs; while in drier ſituations, their whole bulk is leſs, and the limbs are ſtronger and more fleſhy. We ſay nothing of the well-known differences of flavour and weight produced by different kinds of food.

Changes cauſed by Climate are temporary.—Two very different opinions have been maintained concerning theſe changes, produced by the action of external cauſes on the bodies of animals. Some, as Buffon, Blumenbach, Zimmermann, (Geographiſche geſchichte der Menſchen, &c.) contend that they are tranſmitted to the offspring, and thus cauſe varieties: others argue that the effect terminates in the individual; that the young animal is not in the ſlighteſt degree modified by it, but is born with the original properties, and conſtitution of the parents, and a ſuſceptibility only of the ſame changes when expoſed to the ſame cauſes. The latter opinion has been moſt ably defended in the inaugural diſputation of Dr. Prichard, Edinburgh, 1808, and ſeems to us to reſt upon the moſt incontrovertible grounds.

The change in the colour of the human ſkin, from expoſure to ſun and air, is obviouſly temporary; for it is diminiſhed and even removed when the cauſes no longer act. The diſcolouration, which we term tanning or being ſun-burnt, as well as the ſpots called freckles, are moſt incidental to fair ſkins, and diſappear when the parts are covered, or no longer expoſed to the ſun. The children of the huſbandman or of the ſailor, whoſe countenance bears the marks of other climes, are juſt as fair as thoſe of the moſt delicate and pale inhabitant of a city: nay, the Moors, who have lived for ages under a burning ſun, ſtill have white children; and the offspring of Europeans in the Indies have the original tint of their progenitors. Blumenbach has been led into a miſtake on this point by an Engliſh author (Hawkeſworth, in Collection of Voyages, v. iii. p. 374), who aſſerts that Creoles are born with a different complexion and caſt of countenance, from the children of the ſame parents brought forth in their native country. In oppoſition to this ſtatement, from one who was not an eye-witneſs, we ſhall place the authority of Long, who, in his hiſtory of Jamaica, affirms "that the children born in England have not, in general, lovelier or more tranſparent ſkins, than the offspring of white parents in Jamaica." The "auſtrum ſpirans vultus & color," which this acute and learned naturaliſt aſcribes to the Creole, is merely the acquired effect of the climate, and not a character exiſting at birth.

"Nothing," ſays Dr. Prichard, "ſeems to hold true more univerſally, than that all acquired conditions of body, whether produced by art or accident, end with the life of the individual in whom they are produced. Many nations mould their bodies into unnatural forms: the Indians flatten their foreheads (See CRANIUM); the Chineſe women reduce their feet to one-third of their natural dimenſions; ſavages elongate their ears; many races cut away the prepuce. We conſtantly mutilate our domeſtic animals by removing the tail or ears, and our own ſpecies are often obliged by diſeaſe to ſubmit to the loſs of limbs. That no deformity or mutilation of this kind is hereditary, is ſo plainly proved by every thing around us, that we wonder how the contrary opinion ſhould have gained any advocates. After the operation of circumciſion has prevailed for more than three thouſand years, the Jews are ſtill born with prepuces, and ſtill obliged to ſubmit to the painful rite. Docked horſes and cropped dogs bring forth young with entire ears and tails. But for this ſalutary law, what a frightful ſpectacle would every race of animals exhibit! The miſchances of all preceding times would overwhelm us with their united weight, and the catalogue would be continually increaſing, until the univerſe, inſtead of diſplaying a ſpectacle of beauty and pleaſure, would be filled with maimed, imperfect, and monſtrous ſhapes."

The changes produced in the coverings of animals by external cauſes, and thoſe brought about by food, are equally confined to the preſent race. If a breed with different qualities be required, other individuals, poſſeſſing thoſe qualities, muſt be employed.

Permanent Varieties of Animals are only produced by Generation.—That the foregoing cauſes are not adequate to account for thoſe more ſignal diverſities, which conſtitute differences of race in animals, will be readily admitted. Theſe can be explained only by native or congenital variety, as we have ſhewn in enumerating thoſe points, in which men and animals differ. In the preſent ſtate of phyſiological knowledge, we cannot attempt to ſhew how it happens that an offspring is produced, differing from the parents in ſome characters, which are conveyed by hereditary ſucceſſion; how a grey rabbit or cat ſhall bring forth at one birth, and from one father, yellow, black, white, and ſpotted young; how a white ſheep ſhall have a black lamb; or the ſame parents, Leucæthiopic and ordinary children at different times. In ſhort, in conſidering all the circumſtances under which animal bodies are influenced by external agents, we muſt be contented with ſtating the facts that prove the influence of ſuch cauſes, without attempting to explain how they produce their effects. As there is ſo little of a ſatisfactory nature aſcertained on this head, we ſhould be afraid of diſguſting the ſenſible reader, by ſubſtituting ſpeculation in the place of more ſolid information.

Influence of Mode of Life in producing Varieties.—The ſtate of domeſtication, or the artificial mode of life, which they lead under the dominion of man, is the moſt powerful cauſe in favouring the production of varieties in the animal kingdom. Wild animals, uſing always the ſame kind of food, being expoſed to the action of the climate without fire or artificial covering, chuſe, each of them according to its nature, their zone, and country: inſtead of diſperſing themſelves, like man, they continue in thoſe places, which are the moſt friendly to their conſtitutions. Hence their nature undergoes no change; their figure, colour, ſize, proportion, &c. are unaltered; and there is conſequently no difficulty in determining their ſpecies. But, ſays Buffon, when forced by man, or by any revolution on the globe, to abandon their native ſoil, their nature undergoes changes ſo great, that, to recognize them, recourſe muſt be had to accurate examination, and even to experiment and analogy. If to theſe natural cauſes of alteration in free animals, we add that of the empire of man over thoſe which he has reduced to ſlavery, we ſhall

ſhall be aſtoniſhed at the degree to which tyranny can degrade and disfigure nature; we ſhall perceive the marks of ſlavery, and the prints of her chains; we ſhall find that thoſe wounds are deeper and more incurable in proportion to their antiquity: and that, in the preſent condition of domeſtic animals, it is, perhaps, impoſſible to reſtore their primitive form, and thoſe attributes of nature, which we have taken from them." vol. iv. p. 6. To trace back our domeſtic animals to their wild originals, is in all caſes difficult, in ſome impoſſible: long ſlavery has ſo degraded their nature, that the primitive animal may be ſaid to be loſt, and a degenerated being, running into endleſs varieties, is ſubſtituted in its place. The wild original of the ſheep was for a long time unknown: Buffon conceived that he diſcovered it in the mouflon or argali (ovis ammon); and Pallas, who had an opportunity of ſtudying this animal, adds the weight of his highly reſpectable authority to the opinion of the French naturaliſt. Yet, Blumenbach regards the argali as a diſtinct ſpecies. Should we allow the latter to be the parent of our ſheep, and conſequently admit that the differences are explicable by degeneration, no difficulty can any longer exiſt about the unity of the human ſpecies. An incomplete horn of the argali, in the academical muſeum at Gottingen, weighs nine pounds. Blumenbach, handbuch der Naturgeſchichte. p. 111, note.

"Let us compare," ſays Buffon, "our pitiful ſheep with the mouflon, from which they derived their origin. The mouflon is a large animal. He is fleet as a ſtag, armed with horns and thick hoofs, covered with coarſe hair, and dreads neither the inclemency of the ſky, nor the voracity of the wolf. He not only eſcapes from his enemies by the ſwiftneſs of his courſe, and ſcaling, with truly wonderful leaps, the moſt frightful precipices; but he reſiſts them by the ſtrength of his body, and the ſolidity of the arms with which his head and feet are fortified. How different from our ſheep, which ſubſiſt with difficulty in flocks, who are unable to defend themſelves by their numbers, who cannot endure the cold of our winters without ſhelter, and who would all periſh, if man withdrew his protection. So completely are the frame and capabilities of this animal degraded by his aſſociation with us, that it is no longer able to ſubſiſt in a wild ſtate, if turned looſe, as the goat, pig, and cattle are. In the warmeſt climates of Aſia and Africa, the mouflon, who is the common parent of all the races of this ſpecies, appears to be leſs degenerated than in any other region. Though reduced to a domeſtic ſtate, he has preſerved his ſtature and his hair, but the ſize of his horns is diminiſhed. Of all domeſtic ſheep, thoſe of Senegal and India are the largeſt, and their nature has ſuffered leaſt degradation. The ſheep of Barbary, Egypt, Arabia, Perſia, Tartary, &c. have undergone greater changes. In relation to man, they are improved in ſome articles, and vitiated in others; but, with regard to nature, improvement, and degeneration are the ſame thing; for they both imply an alteration of original conſtitution. Their coarſe hair is changed into fine wool. Their tail, loaded with a maſs of fat, (and ſometimes reaching the weight of 40 pounds), has acquired a magnitude ſo incommodious, that the animals trail it with pain. While ſwollen with ſuperfluous matter, and adorned with a beautiful fleece, their ſtrength, agility, magnitude, and arms are diminiſhed: theſe long-tailed ſheep are half the ſize only of the mouflon. They can neither fly from danger, nor reſiſt the enemy. To preſerve and multiply the ſpecies, they require the conſtant care and ſupport of man. The degeneration of the original ſpecies is ſtill greater in our climates. Of all the qualities of the mouflon, our ewes and rams have retained nothing but a ſmall portion of vivacity, which yield to the crook of the ſhepherd. Timidity, weakneſs, reſignation, and ſtupidity, are the only melancholy remains of their degraded nature." Vol. iv. p. 7.

It will naturally be expected that degeneration has operated moſt deeply and variouſly on thoſe domeſtic animals which man has ſubjected for many ages, and ſo completely, that they propagate in their enſlaved condition; not on thoſe, of whom each individual is brought into captivity from his wild ſtate, as the elephant; nor on ſuch as have not been taken into foreign climates, as the rein-deer, which is confined to a very limited portion of the globe. The pig is a good example, becauſe his deſcent is more clearly made out than that of many others. The dog indeed degenerates before our eyes, but it will hardly ever, perhaps, be aſcertained whether there is one or more ſpecies. The extent of degeneration can be obſerved in the domeſtic pig, becauſe, we believe, no naturaliſt has hitherto been ſceptical enough to doubt whether he deſcended from the wild boar, and he was certainly firſt introduced by the Spaniards into the New World. The pigs conveyed, in 1509, from Spain to the Weſt India iſland Cubagua, then celebrated for the pearl fiſhery, degenerated into a monſtrous race with toes half a ſpan long. Herrera, hechos de los Caſtellanos en las Iſlas, &c. (vol. i. p. 239.) Thoſe of Cuba became more than twice as large as their European progenitors: Clavigero, ſtoria antica del Meſſico. (vol. iv. p. 145.) How remarkably again have the domeſtic ſwine degenerated from the wild ones in the old world; in the loſs of the ſoft downy hair from between the briſtles, in the vaſt accumulation of fat under the ſkin, in the form of the cranium, in the figure and growth of the whole body. The varieties of the domeſtic animal too are very numerous: in Piedmont they are almoſt invariably black; in Bavaria reddiſh-brown, in Normandy white, &c. The breed in England with ſtraight back and large pendulous belly is juſt the reverſe of that in the North of France, with high convex ſpine, and hanging head; and both are different from the German breed; to ſay nothing of the ſolid-ungular race found in herds in Hungary and Sweden, and already known by Ariſtotle, and many other varieties.

The aſs, in its wild ſtate, is remarkably ſwift and lively, and ſtill continues ſo in his native countries in the Eaſt; the biſon, or wild ox, has a long flowing mane, hanging almoſt to the ground.

The original ſtock of our poultry cannot be determined, nor can the varieties into which they have run be enumerated. No wild bird in our climates reſembles the domeſtic cock: the pheaſant, grous, and wood-hen, are the only analogous kinds; and it is uncertain whether theſe would intermix, and have prolific progeny. They have conſtituted diſtinct and ſeparate ſpecies from the earlieſt times; and they want the combs, ſpurs, and pendulous membranes of the gallinaceous tribes. Buffon, vol. xii. p. 112.

There are twenty-nine varieties of canary birds known by name, all produced from the grey bird. Buffon, vol. xiv. p. 61.

Moſt of the mammalia, which have been tamed by man, betray their ſubjugated ſtate by having the ears and tail pendulous; a condition of the former parts which, we believe, belongs to no wild animal. In many, the very functions of the body, as the ſecretions, generation, &c. are greatly changed. The domeſtic ſow produces young twice a year; the wild animal only once: it frequently brings forth monſtrous fœtuſes, and is invaded by a new ſpecies of hydatids, forming what is called the meaſles in pork.

A good hen, well ſupplied with food, lays 100 eggs between

tween ſpring and autumn; in the wild ſtate ſhe only produces eighteen or twenty. Buffon, vol. ii. p. 30.

The application of theſe facts to the queſtion concerning the human ſpecies is very obvious. If domeſticated animals vary, becauſe they have been taken from their primitive condition, and expoſed to the operation of many, to them unnatural, cauſes; if the pig is remarkable among theſe for its varieties, becauſe it has been the moſt expoſed to cauſes of degeneration; we ſhall be at no loſs to account for the diverſities in man, who is, in the true, though not ordinary ſenſe of the word, more of a domeſticated animal than any other. We know the wild ſtate of moſt of them; but we are ignorant of the natural wild condition to which man was deſtined. Probably there is no ſuch ſtate; becauſe nature, having limited him in no reſpect, having fitted him for every kind of life, every climate, and every variety of food, has given him the whole earth for his abode, and both the organized kingdoms for his nouriſhment.

The numerous varieties of domeſtic animals, which are inconteſtibly the offspring of domeſtication, may be regarded as a refutation of the general poſition, which we lately laid down, that no acquired condition is tranſmitted by generation. Theſe diverſities are undoubtedly the ſtrongeſt argument in favour of the changes produced by the way of life being hereditary; and we are not hitherto warranted in poſitively denying this. They admit of explanation, however, on another principle; *viz.* that the domeſtic ſtate cauſes a diſpoſition to the production of native varieties, which, as we well know, are hereditary. We know no direct obſervations, by which it can be decided that modifications of colour, form, &c. produced by external cauſes, are in no inſtance tranſmitted to the offspring, and that they are all firſt produced as native varieties in the courſe of generation. Analogy, however, very much favours this notion.

Such, then, are the cauſes by which the varieties of man may be accounted for. Although we have acknowledged our entire ignorance of the manner in which theſe operate, we have proved that they exiſt, and have ſhewn, by copious analogies, that they are ſufficient to explain the phenomena. The tendency, under certain circumſtances, to alterations of the original colour, form, and other properties of the body, and the law of tranſmiſſion to the offspring, are the ſources of varieties in man and animals, and thereby modify the ſpecies: climate, food, way of life, in a word, all the phyſical and moral cauſes that ſurround us, act indeed powerfully on the individual, but do not change the offſpring, except in the indirect manner alluded to in the preceding paragraph. We ſhould, therefore, openly violate the rules of philoſophiſing, which direct us to aſſign the ſame cauſes for natural effects of the ſame kind, and not to admit more cauſes than are ſufficient for explaining the phenomena, if we recurred, for the purpoſe of explaining the varieties of man, to the perfectly gratuitous aſſumption of originally different ſpecies, or called to our aid the operation of climate, &c.

Yet, if it be allowed that all men are of the ſame ſpecies, it does not follow that they all deſcend from the ſame family. Some contend that all parts of the globe were furniſhed at firſt with men and animals, and lay great ſtreſs on the difficulty which the race would experience in extending over wide tracts, and gaining acceſs to remote regions and iſlands. A reference to facts will ſhew us that theſe difficulties have been overcome. The numerous iſlands of the Pacific, in many inſtances very diſtant from each other, and from the continent, are inhabited by men of the ſame race; and we meet in Madagaſcar and Eaſter iſland, ſeparated by nearly half the globe, with men of the ſame origin, employing the ſame language. This view is confirmed by the very intereſting facts firſt noticed by Buffon, that no animals are found in both continents, but ſuch as are able to bear the cold of theſe regions where they probably join; and that not a ſingle animal of the torrid zone is common to the old world and the new.

Conſideration of the Opinion, which explains the Varieties of Mankind by the Operation of Climate. Statement of the Argument.—By the moſt intelligent and learned writers on the varieties of mankind, they have been explained altogether by the operation of adventitious cauſes, as climate, particularly the light and heat of the ſun, food, and way of life. It has been conſidered that theſe, acting on men originally alike, produce various bodily diverſities, and affect the colour of the ſkin eſpecially; and that ſuch alterations, tranſmitted to the offspring, and gradually increaſed through a long courſe of ages, account very ſufficiently for all the differences obſerved at preſent in the inhabitants of the different regions of the globe. If we were inclined to ſubmit in this queſtion to authority, the number and celebrity of the philoſophers, who have contended for the influence of climate, and other phyſical and moral cauſes, would certainly compel our aſſent to their opinions. Buffon, Blumenbach, Smith (Eſſay on the Cauſes of the Variety of Complexion and Figure in the human Species, Philadelphia), Zimmerman (Geographiſche Geſchichte des Menſchen, &c.) Ludwig (Grundriſs der Naturgeſchichte des Menſchen-ſpecies, &c.), are only a few of thoſe who have adopted and defended this view of the ſubject.

Opinion of Buffon.—"The heat of the climate," ſays Buffon, "is the chief cauſe of blackneſs among the human ſpecies. When this heat is exceſſive, as in Senegal and Guinea, the men are perfectly black; when it is a little leſs violent, the blackneſs is not ſo deep; when it becomes ſomewhat temperate, as in Barbary, Mongolia, Arabia, &c. mankind are only brown; and laſtly, when it is altogether temperate, as in Europe and Aſia, men are white. Some varieties, indeed, are produced by the mode of living. All the Tartars (Monguls), for example, are tawny; while the Europeans, who live under the ſame latitude, are white. This difference may ſafely be aſcribed to the Tartars being always expoſed to the air, to their having no cities or fixed habitations, to their ſleeping conſtantly on the ground, and to their rough and ſavage manner of living. Theſe circumſtances are ſufficient to render the Tartars more ſwarthy than the Europeans, who want nothing to make life eaſy and comfortable. Why are the Chineſe fairer than the Tartars, though they reſemble them in every feature? Becauſe they are more poliſhed; becauſe they live in towns, and practiſe every art to guard themſelves againſt the injuries of the weather: while the Tartars are perpetually expoſed to the action of the ſun and air.

"Climate may be regarded as the chief cauſe of the different colours of men: but food, though it has leſs influence than colour, greatly affects the form of our bodies. Coarſe, unwholeſome, and ill-prepared food makes the human ſpecies degenerate. All thoſe people, who live miſerably, are ugly and ill made. Even in France, the country people are not ſo beautiful as thoſe who live in towns: and I have often remarked, that in thoſe villages, where the people are richer and better fed than in others, the men are likewiſe more handſome, and have better countenances. The air and the ſoil have great influence on the figures of men, beaſts, and plants.

"Upon the whole, every circumſtance concurs in proving that mankind are not compoſed of ſpecies eſſentially different

ferent from each other; that, on the contrary, there was originally but one fpecies, which, after multiplying and fpreading over the whole furface of the earth, have undergone various changes by the influence of climate, food, mode of living, epidemic difeafes, and mixture of diffimilar individuals; that, at firft, thefe changes were not fo confpicuous, and produced only individual varieties; that thefe varieties became afterwards more fpecific, becaufe they were rendered more general, more ftrongly marked, and more permanent, by the continual action of the fame caufes; that they are tranfmitted from generation to generation, as deformities or difeafes pafs from parents to children; and that, laftly, as they were originally produced by a train of external and accidental caufes, and have only been perpetuated by time, and the conftant operation of thefe caufes, it is probable that they will gradually difappear, or, at leaft, that they will differ from what they are at prefent, if the caufes which produced them fhould ceafe, or if their operation fhould be varied by other circumftances and combinations." Natural Hiftory, by Wood, vol. iii. p. 443—446.

Opinion of Smith.—"In tracing the globe," fays Smith, "from the pole to the equator, we obferve a gradation in the complexion, nearly in proportion to the latitude of the country. Immediately below the arctic circle, a high and fanguine colour prevails: from this you defcend to the mixture of red and white: afterwards fucceed the brown, the olive, the tawny, and, at length, the black, as you proceed to the line. The fame diftance from the fun, however, does not, in every region, indicate the fame temperature of climate. Some fecondary caufes muft be taken into confideration, as correcting and limiting its influence. The elevation of the land, its vicinity to the fea, the nature of the foil, the ftate of cultivation, the courfe of winds, and many other circumftances, enter into this view. Elevated and mountainous countries are cool, in proportion to their altitude above the level of the fea, &c. &c." Effay, p. 8—10.

Opinion of Blumenbach.—Blumenbach informs us how climate operates in modifying the colour of the fkin, but does not attempt to explain its effects on the ftature, proportions, &c. He ftates that the proximate caufe of the dark colour of the integuments is an abundance of carbone, fecreted by the fkin with hydrogen, precipitated and fixed in the rete mucofum by the contact of the atmofpheric oxygen. (De Variet. p. 124.) He obferves further, that this abundance of carbone is moft diftinctly noticeable in perfons of an atrabilarious temperament; which fact, together with many others, proves the intimate connection between the biliary and the cutaneous organs; that hot climates exert a very fignal influence on the liver; and thus, that an unnatural ftate of the biliary fecretion, produced by heat, and increafed through many generations, caufes the veffels of the fkin to fecrete that abundance of carbone, which produces the black colour of the Negro. Ibid. p. 126—137.

Certain fuperficial Views favourable to this Opinion.—It cannot be fuppofed that men of undoubted talents and learning would take up thefe opinions without any foundation at all; and accordingly we find that there is a flender mixture of truth in thefe ftatements: but it is fo enveloped in a thick cloud of error, and fo concealed by mifreprefentation and exaggeration, that we do not recognzie it without difficulty. The colour of Europeans nearly follows the geographical pofitions of countries: this part of the world is occupied almoft entirely by a white race, of which the individuals are fairer in cold latitudes, and more fwarthy or fun-burnt in warm ones: thus, the French may be darker than the Englifh, the Spaniards than the French, and the Moors than the Spaniards. In the fame way, where different parts of a country differ much in latitude and in temperature, the inhabitants may be browner in the fouth than in the north: thus, the women of Granada are faid to be more fwarthy than thofe of Bifcay, and the fouthern than the northern Chinefe, &c. Thefe diverfities are produced by the climate, as we have already explained. The effect goes off if the caufe be removed: it terminates in the individual, and is never tranfmitted to the offspring, as we fhall prove moft incontrovertibly prefently.

On a fuperficial view again, we obferve that temperate Europe is occupied by a white race, and that the blacks, of whom we fee and hear moft, dwell chiefly under the burning funs and on the parched fands of Africa and Afia: the numerous whites who live in hot, and the greater number of dark coloured people who are found in cold countries, are not taken into the account in thefe imperfect and partial comparifons.

We are particularly furprifed that the acutenefs and good fenfe of Blumenbach fhould have allowed him to refort to an explanation grounded on fuch remote analogies, and fo obvioufly weak and inadequate, as that by which he attempts to account for the black colour of the Negro. To require us to believe that all the dark coloured races labour under hepatic difeafe, when our fenfes inform us that they are in perfect health, is really too much: the ftatement is too abfurd to require ferious refutation.

Arguments againft it.—We proceed to fhew that climate does not caufe the diverfities of mankind; and in this confideration, our remarks are chiefly directed to the colour of the fkin, as that is the part in which its operation has been regarded, by all the defenders of its influence, as the moft unequivocal: the reafoning, however, will apply in general to the other points of difference, as well as to this.

The uniform colour of all parts of the body is a ftrong argument againft thofe who afcribe the blacknefs of the Negro to the effect of the fun's rays. The glans penis, the cavity of the axilla, the infide of the thigh are juft as black as any other parts; indeed, the organs of generation, which are always covered, are among the blackeft parts of the body. Neither is the peculiar colour of the Negro confined to the fkin; a fmall circle of the conjunctiva, round the cornea, is blackifh, and the reft of the membrane has a yellowifh-brown tinge. The fat has a deep yellow colour, at leaft in many of them, which could be diftinguifhed by a very fuperficial infpection, from that of an European. On thefe points the teftimony of Soemmering coincides with our own obfervation. (Ueber die körperl. Verfch. § 7 and 46.) The fpecies of domeftic fowls in the Eaft Indies, with black periofteum, affords a further proof that the operation of the fun's rays is not the caufe of colour in animal bodies.

On the other hand, a black ftate of the fkin is fometimes partially produced in individuals of the white races. In the faireft women, towards the end of pregnancy, fpots of a more or lefs deep black colour have been often obferved; they gradually difappear after parturition. "The dark colour of the fkin," fays White, "in fome particular parts of the body, is not confined to either the torrid or frigid zones: for in England the nipple, the areola round the nipple, the pudenda, and the verge of the anus, are of a dark brown, and fometimes as black as in the Samoiede women. It is to be remarked that the colour of thefe parts grows darker in women at the full period of geftation. One morning I examined the breafts of twenty women in the lying-in hofpital in Manchefter, and found that nineteen of them had dark-coloured nipples; fome of them might be faid to be black, and the areola round the nipple, from one inch to

two

two inches and a half in diameter, was of the fame colour. (On the regular Gradation, p. 114. Camper, Kleinere Schriften, vol. i. part i. p. 47.) Le Cat mentions a woman near Paris, in whom the abdomen became black at each pregnancy, and afterwards recovered its colour; in another the fame change occurred in the leg. See Blumenbach de Variet. page 156, note z.

If we take the trouble of examining the races in any particular divifion of the world, we fhall quickly find that the opinion, which afcribes their diftinguifhing characters to climate, muft be given up; that the fame race inhabits the moft different regions, preferving in all an uniformity of character; that different races are found in the fame countries, and that thofe, who have changed their native abodes for fituations, in which, according to the hypothefis, they ought to have undergone a complete metamorphofis, ftill retain their original diftinctions.

Arguments from the Races that occupy Europe.—In the north of Europe, as alfo in the north of Afia and America, that is, in countries neareft to the pole, in which, according to the opinion above ftated, the whiteft races ought to be found, we have very brown and black people: they are much darker coloured than any other Europeans. The Moors in Africa, and the Arabs of the defert are born with a white fkin, and continue fair unlefs adventitious caufes are applied. But the Laplanders and Greenlanders, who hardly ever feel a moderate heat from the rays of the fun, are all very dark. "The Laplanders," fays Buffon, "the inhabitants of Nova Zembla, the Borandians, the Samoieds, the northern Tartars, the Oftiacs of the old continent, and the Greenlanders and the favages to the north of the Efkimaux Indians in the new continent, appear to be all the fame race, who have extended and multiplied along the coafts of the North fea, in deferts, and under climates which could not be inhabited by other nations. All thefe people have broad large faces, and flat nofes. Their eyes are of a yellowifh-brown colour, inclining to black; their eye-lids extend towards the temples: their cheek-bones are very prominent; their mouths are large, and their lips thick and reflected; the under part of their face is narrow; they have a fqueaking voice; the head is large, the hair black and fmooth, and the fkin is of a tawny or fwarthy hue. Their fize is diminutive, but, though meagre, their form is fquat. Moft of them are only four feet high, and their talleft men exceed not four feet and a half" Vol. iii. p. 302.

It is curious to obferve how eafily the afferters of the power of climate in changing the human body get over an inftance fo fatal to their opinions: they tell us roundly that great cold has the fame effect as great heat: "When the cold becomes extreme, it produces effects fimilar to thofe of violent heat. The Samoiedes, Laplanders and natives of Greenland are very tawny; we are even affured that fome of the Greenlanders are as black as the Africans; thus the two extremes approach each other: great cold and great heat produce the fame effect upon the fkin, becaufe each of thefe caufes acts by a quality common to both; and this quality is the drynefs of the air, which, perhaps is equally great in extreme cold and extreme heat. Both cold and heat dry the fkin, and give it that tawny hue which we find among the Laplanders. Cold contracts all the productions of nature. The Laplanders, accordingly, who are perpetually expofed to all the rigours of froft, are the fmalleft of the human fpecies." Buffon, vol. iii. p. 443. See alfo Smith's Effay.

If this reafoning fhould not convince us, there are other arguments in referve. The ftate of fociety is faid to have great effect on the conformation and colour of the body. The nakednefs of the favage, the filthy greafe and paint with which he fmears his body, his fmoky hut, fcanty diet, want of cleanlinefs, and the undrained and uncleared country which he inhabits, not only, according to Smith, darken his fkin, but render it impoffible that it ever fhould be fair. p. 48—52.) On the other hand, the conveniencies of clothing and lodging—the plenty and healthful quality of food—a country drained, cultivated, and freed from noxious effluvia—improved ideas of beauty—the conftant ftudy of elegance, and the infinite arts for attaining it, even in perfonal figure and appearance, give cultivated an immenfe advantage over favage fociety in its attempts to counteract the influence of climate, and to beautify the human form (p. 53.) What falfe notions muft mankind have hitherto entertained on this fubject! We can no longer believe travellers, who tell us that the fineft forms, and the greateft ftrength are to be feen in favage tribes, and that no ill-formed individuals can be met with amongft them: and as little can we truft the teftimony of our own fenfes, concerning the frequency of deformity and difeafe in civilized fociety; fince there are fo many reafons why the former fhould be deformed, black, and ugly, and the latter well proportioned, fair, and handfome. Unluckily, however, this fine-fpun theory does not correfpond with a few plain facts. Moft of the modern European nations exifted in a more or lefs complete ftate of barbarifm within times of which we have the moft authentic records: fome of thefe were feen and defcribed by philofophers; yet the permanence of their characters is fo remarkable after a greater progreffive civilization than has happened in any other inftance, that thofe defcriptions are applicable with the greateft exactnefs to the fame races of the prefent day. Inftead therefore of accounting for the dark colour, peculiar features, and ftature of the Greenlander, Laplander, and Samoiede, from their fmoke, their dirt, their food, or the coldnefs of the climate, we can have no hefitation in afcribing them to the fame caufe that makes the Briton and the German of this day refemble the portraits of their anceftors, drawn by Cæfar and Tacitus, *viz.* their defcent from a race marked by the fame characters as diftinguifh themfelves. Thefe tribes owe their origin to the Monguls, and retain in the north thofe marks of their defcent, which we find as ftrongly expreffed in the Chinefe, under the widely different latitudes of the fouth. At the fame time, the parent tribes live in the middle of Afia, equally removed from the former and the latter.

With flight exceptions, fays Dr. Prichard, the different countries of Europe are now occupied by the fame nations that have occupied them fince the date of our earlieft authentic accounts. Conquefts have been made by fmall numbers, fo that the races have been little changed by this caufe. Thus when Clovis and his 30,000 Franks reduced the large and populous province of Gaul under their dominion, the bodily characters, and the language of the conquerors were loft in thofe of the conquered. The nations which have inhabited Europe for the laft 2,500 years, confift of three great races, diftinguifhed from each other by their bodily formation, character, and language.

1. The Celtic race, with black hair and eyes, and a white fkin verging to brown, occupies the weft of Europe: to this belong the ancient and modern inhabitants of France, Spain, Portugal, and the greateft part of Italy: the ancient Britons, Welfh, Bretons, Irifh, Scotch, and Manks. The refemblance of the Silures to the Iberi was noticed by Tacitus; it is obvious to every obferver in the prefent time; nor is the obfervation peculiar to the Welfh; it holds good of

of all other Celtic nations. "Silurum colorati vultus, et torti plerumque crines, et posita contra Hispania, Iberos veteres trajecisse, easque sedes occupasse, fidem faciunt." That black hair and a browner complexion belonged to all the Celts, is not only proved by many direct observations, but also because the marks of the sanguine constitution were universally considered as the distinction of the German race.

2. The great German race, characterized by its blue eyes, yellow or reddish hair, fair and red skin, occupies the middle of Europe, and includes the Swedes, Norwegians, Icelanders, Danes, ancient and modern Germans, Saxons and English, Caledonians or Pictæ, and the Lowland Scotch, who have sprung from them, the inhabitants of the Low Countries, the Vandals and Goths, &c. Historical records, and the similarity of language and character both of body and mind, prove that all these people belong to the same race.

3. The east of Europe contains the Sarmatian and Slavonic tribes, characterized by dark hair and eyes, and a darker skin than the German, with perhaps larger limbs than the Celts. To this division belong the Russians, Poles, Croats, Slavons, Bohemians, Bulgarians, Cossacks, and others who speak the Slavonic language. (Diss. Inaug. de Variet. p. 102—109.) He proceeds to shew from Diodorus Siculus, that the Sarmatians descended from the Medes, and were found on the banks of the Tanais, 700 years before the Christian era: by the authority of Herodotus, that they occupied the country between the Tanais and the Borysthenes, when Darius Hystaspes invaded Syria; and from Cluverius, that the coasts of the Baltic, the banks of the Vistula, Prussia, and the country as far as the situation of the Finni and Venedi, were the ancient seats of the Sarmatians. Since then a people of very different race have existed in the neighbourhood of the Germans from the most remote times, how can we explain the differences of the European nations, by the operation of climate, by heat and cold? How does the same sky cause the whiteness of the German and Swede, and the comparatively dark complexion of the Pole and Russian?

But these European races are found also in Asia and Africa. All that part of the former region, which lies to the west of the river Ob, the Caspian sea, and the Ganges; all the north of Africa, Abyssinia, and perhaps other parts still farther south, on the east, are occupied by a race agreeing nearly in character with the Sarmatians and Celts.

Thus it appears, that, excepting the Germans, and the Laplanders and Samoiedes, whom we deem of Mongolian origin, the same native or congenital constitution prevails over the whole of Europe, the western parts of Asia, and the north of Africa. Black hair, dark eyes, and a white skin, tending rather to a brownish tint, than to the peculiar whiteness of the German tribes, belong to the French, Spaniards, Portuguese, Italians, and all the Celts; to the Russians, Poles, and others of Slavonic origin; to the Tatars, commonly confounded with the Mongols, the Circassians and Georgians, the Turks, Greeks, Arabians, Abyssinians, Syrians, Jews, and the inhabitants of Tripoli, Tunis, Algiers and Morocco. That climate cannot be the cause of the identity of character in nations spread over fifty degrees of latitude, and that food, dress, state of civilization, peculiar customs, &c. are equally inefficacious in accounting for this sameness, when we consider how numerous and diversified the nations are in whom it occurs, will be allowed by every unprejudiced observer.

Asiatic Races.—Two races are to be found in Asia, on the east of the Ob and the Caspian. "The vast tracts of mountains that stretch from the Caspian to the remotest borders of the east, have been occupied from time immemorial by the Mongolian tribes, distinct in their conformation from all other races, and more different from the Europeans than any negroes. Their skin varies from yellow-white to olive colour. Their hair is perfectly black from the time of birth. In stature they are short; they have round heads, large ears, oblique eyes, flat noses. To this nation the name of Tartars (Tatars) has been very improperly applied, as they have nothing in common with the true Tatars, who altogether resemble the Europeans. All the east of Asia, except a few spots occupied by Tatars and Ostiaks, the Tschutski, probably derived from the aborigines of America, and the Indians, contains several nations very closely resembling the Monguls, and arising in all probability from the same root. Among these we enumerate the Calmucks and Buriates, a part of the Mongolian nation itself, the Samoiedes, the Tungooses, the Mantchoos, who border on the Chinese, the Chinese themselves, the Jakuts, the Japanese, and the Kamtschatkans. "Calmucæ proprii," says Pallas, "Mongoli, Buriates, Kirguses, Solones Orientales, Tungusi Dauriæ, et Sinenses septentrionales sibi invicem simillimi sunt." (Voy. en Siberie.) "Les Samoyèdes de l'Ob ressemblent beaucoup aux Tungooses. Ils ont le visage plat, rond et large. Ils ont peu de barbe, et les cheveux noirs et rudes." "On trouve les restes de cette nation dans la partie orientale de la Sibérie près de l'Enisséi. Les Koibals, les Kamaches, les Abotors, les Soiots, les Karagasses ont la meme figure que les Samoiedes, et parlent tous leur langue." (Ibid.) "The Kamtschadales and Mungals (Mongols) are swarthy, have black hair, little beard, broad faces, nose short and flat, eyes small and sunk, the belly protuberant, and the legs small. The language of the Kamtschadales resembles the Mungal Chinese." Steller's Voyage to Kamtschatka.

"The Japanese in general, particularly the common people of Nipon, are ugly, short, strong, thick-legged, tawny, with flattish noses and thick eye-lids, though the eye stands not so deep in the forehead as in the Chinese. The noble families are more majestic in shape and countenance, and more like Europeans." Kæmpfer.

"The Mantchoo Tatars are scarcely distinguishable from the Chinese by external appearances: the Chinese are somewhat taller, but their features almost exactly resemble. The natural colour, both of Chinese and Tatars, seems to be that tint between a fair and a dark complexion, which we distinguish by the word brunet or brunette; and the shades of this complexion are deeper or lighter, according as they have been more or less exposed to the influence of climate. The women of the lower class, who labour in the fields, or who dwell in vessels, are almost invariably coarse, ill-featured, and of a deep brown complexion, like that of the Hottentots. We saw women in China, though very few, who might pass for beauties even in Europe. A small black or dark brown eye, a short rounded nose, generally a little flattened, lips considerably thicker than in Europeans, and black hair, are universal." (Barrow's China.) "Besides the general similarity of the tribes occupying such vast and distant regions, it is curious to observe that the Samoiedes, Kamtschatkans, and others towards the north, have a much darker skin than the Calmucks, Mantchoos, and Chinese in warmer countries." Prichard's Disputatio, p. 93—99.

"India is inhabited by a mixed race, made up of the aborigines, and of others whom the pursuits of war and conquest have at various times brought there. The religion of Brahma seems to have been conveyed there from the north;

north; and at later periods vaſt numbers of the Mongols have entered and conquered the country. Theſe mixtures have effaced the peculiar characters of the original inhabitants, which we muſt, therefore, ſeek for in the iſlands, protected by their ſituation from ſuch viſits. The iſlands of the Indian ſea, as well as thoſe of the Pacific, contain two races of men, differing in many reſpects. One of theſe approaches, and in ſome inſtances equals, the blackneſs of the Negro: the hair is curled and woolly, the body ſlender, the ſtature ſhort, the diſpoſition barbarous and cruel. The other is more like the Indians of the continent, has a fairer ſkin, larger limbs and ſtature, better proportions, and exhibits ſome marks of humanity and civilization. According to Forſter, the former, who are aborigines, have occupied the middle and mountainous parts of many iſlands, leaving the coaſts and plains to the more recent coloniſts. They occupy the higheſt parts of the Moluccas, the Philippines, Formoſa, and Borneo; all New Guinea, New Britain, Hibernia and Caledonia, Tanna, Mallicollo, New Holland, and Van Diemen's land. The more recent nation occupies Sumatra, and the other iſlands of the Indian ſea, Otaheite, and the Society iſlands, the Friendly iſlands, Marqueſas, Ladrones, Marian and Caroline iſlands, New Zealand, Sandwich and Eaſter iſlands. The language of all the latter reſembles the Malay, and there can be no doubt that they ariſe from that race, and have ſpread by their ſhips over theſe diſtant ſpots. The black people are every where barbarous, and, according to Forſter, have languages not agreeing with each other. In neither can we perceive any traces of the influence of climate. The latter race, ſcattered in various parts of the vaſt iſland of New Holland, which has ſuch variety of temperature, every where retains its black colour, although the climate at the Engliſh ſettlement is not much like unlike that of England; and in Van Diemen's land, extending to 45° S. lat. (it is well underſtood that the cold is much more ſevere in the ſouthern hemiſphere, at an equal diſtance from the equator, than in the northern) they are of a deep black, and have curled hair like the negroes.

"We may make the ſame remarks concerning the Malay race. The Sumatrans under a vertical ſun are the faireſt people of the Indian iſlands: and Marſden relates, that they ſometimes approach the whiteneſs of Europeans. The inhabitants of Otaheite are very fair: yellow hair is not unfrequently ſeen amongſt them; while thoſe of New Zealand, twice as diſtant from the equator, are much darker." (Ibid. 85—89.) It is ſufficiently obvious that in Aſia, where we have countries with every variety of ſituation and temperature, at every diſtance from the equator, with every diverſity of elevation, hills, vallies, plains, iſlands and continents, we can trace no effect of climate on the colour, or on any other character of the human race.

African Races.—On the hypotheſis, which aſſigns the varieties of mankind to the operation of climate as their cauſe, we ſhould expect to find in Africa all tribes under the equator of the moſt intenſely black colour; the tinge ſhould become lighter and lighter as we proceed thence towards the ſouth, and the complexion ought to be white when we arrive at regions which enjoy an European climate. This, however, is by no means the caſe. The Abyſſinians, on the eaſt, with dark olive colour and long hair, are placed near the equator, and ſurrounded by negroes. In the ſame part alſo, the Gallas, a great and barbarous nation, having, according to Bruce, long black hair, and white ſkin verging to brown, occupy extenſive regions under the equator itſelf. On the other hand, as we proceed from the equator towards the ſouth, through tribes of negroes, we find the black colour continued with undiminiſhed intenſity. It is known in the Weſt Indies, that the Congo negroes in the blackneſs of their ſkin and woolly hair equal any race of Africans. Paterſon aſſures us that the Caffres, within a few degrees of the Cape of Good Hope, where the climate is ſo far from being intolerably hot, that the corn is often hurt by the winter froſt, are of the deepeſt colour; and the ſame fact is familiarly known of the ſurrounding tribes.

The iſland of Madagaſcar, which is cooled by the mild breezes of the Indian ocean, and ought, therefore, to contain a white race, has two kinds of natives: one of olive colour with dark hair; the other true negroes.

The Hottentots, at one or two degrees from the deep black Caffres, are of a browniſh-yellow colour: this diſtance can hardly account for the difference. The obſervations of Barrow on the countenance and form of this race, render it probable that they owe their origin in part to the Chineſe, which circumſtance will enable us to explain their colour very eaſily. He ſays that the eye-lids are joined towards the noſe, by a rounded ſweep without any angle: that the limbs and joints are ſmall both in the Hottentots and the Chineſe: that the voice and mode of ſpeaking are nearly the ſame in both: that a broad noſe, ſlanting eyes depreſſed towards the noſe, and other features, are common to both. The hair has a middle character between that of the Negro and Chineſe; it is ſuch, in ſhort, as the intermixture of the two races may be expected to produce.

When we conſider how large an extent of Africa is occupied by the black woolly-haired negroes, and that theſe regions vary in their latitude, their elevation, and every other point; that they include ſandy deſerts, coaſts, rivers, hills, vallies, and very great varieties of climate, the concluſion that theſe adventitious circumſtances do not influence the colour or other properties of the race is irreſiſtible.

American Races.—It only remains for us to examine the continent of America, which, as it ſtretches uninterruptedly from the neighbourhood of the north pole to 55° S. lat. and includes regions diverſified in every poſſible way, affords the moſt ample opportunity for the developement of all the changes that ſuch cauſes can produce; and to examine whether the facts aſcertained concerning its inhabitants are more favourable to the hypotheſis of climate than what we have obſerved in the other three diviſions of the world.

The reports of travellers are unanimous concerning the identity of character in the whole American race: copper-coloured ſkin, long and ſtraight black hair, and a certain caſt of features, are ſaid to belong to all the inhabitants of this extenſive continent. How remarkable this agreement is may be collected from the ſtatement ſometimes made, that a perſon who has ſeen one may conſider that he has ſeen all; which, however, in its full extent, muſt be conceived as an exaggerated or partial view. The Eſquimaux are not included in this account: their colour is more of the olive caſt; in which, as well as in other points, they betray their Aſiatic origin.

Herrara, Ulloa, and others who have viſited the American continent, affirm, that all the native tribes, both of the northern and ſouthern diviſions, are of the ſame colour. We may cite the teſtimonies of Stedman, Hearn and Mackenzie, Wallis and Cook, who aſcribe the copper colour reſpectively to the natives near Surinam, thoſe in the regions fartheſt north, and to the Patagonians and inhabitants of Terra del Fuego. Humboldt, whoſe extenſive opportunities of obſervation and philoſophic ſpirit give great weight to his ſtatements, confirms this repreſentation in the moſt ample manner.

"The Indians of New Spain bear a general reſemblance

to

to those who inhabit Canada, Florida, Peru, and Brazil. They have the same swarthy and copper colour, flat and smooth hair, small beard, squat body, long eye, with the corner directed upwards towards the temples, prominent cheek-bones, thick lips, and an expression of gentleness in the mouth, strongly contrasted with a gloomy and severe look. The American race, after the Hyperborean race, is the least numerous; but it occupies the greatest space in the globe. Over a million and a half of square leagues, from the Terra del Fuego islands to the river St. Lawrence and Beering's straits, we are struck at the first glance with the general resemblance in the features of the inhabitants. We think we perceive that they all descend from the same stock, notwithstanding the enormous diversity of language that separates them from each other. However, when we reflect more seriously on this family likeness, after living longer among the indigenous Americans, we discover that celebrated travellers, who could only observe a few individuals on the coasts, have singularly exaggerated the analogy of form among the Americans."—"The uniformity of the red coppery complexion, and dark, coarse, and glossy hair, conceals for a long time the diversity of individual features." "The Indians of New Spain have a more swarthy complexion than the inhabitants of the warmest climates of South America. This fact is so much the more remarkable, as in the race of Caucasus, which may also be called the European Arab race, the people of the south have not so fair a skin as those of the north. Though many of the Asiatic nations, who inundated Europe in the sixth century, had a very dark complexion, it appears that the shades of colour observable among the white race, are less owing to their origin or mixture than to the local influence of the climate. This influence appears to have almost no effect on the Americans and Negroes. These races, in which there is abundant deposition of carburetted hydrogen in the corpus mucosum or reticulatum of Malpighi, resist in a singular manner the impressions of the ambient air. The Negroes of the mountains of Upper Guinea are not less black than those who live upon the coast. There are, no doubt, tribes of a colour by no means deep among the Indians of the new continent, whose complexion approaches to that of the Arabs or Moors. We found the people of the Rio Negro swarthier than those of the lower Orinoco, and yet the banks of the first of these rivers enjoy a much cooler climate than the more northern regions. In the forests of Guinea, especially near the sources of the Orinoco, are several tribes of a whitish complexion, the Guaicas, Gunjaribs, and Arigues, of whom several robust individuals, exhibiting no symptom of the asthenical malady which characterizes Albinos, have the appearance of true Mestizos. Yet these tribes have never mingled with Europeans, and are surrounded by other tribes of a dark brown hue. The Indians in the torrid zone, who inhabit the most elevated plains of the Cordillera of the Andes, and those who, under the 45° of S. lat. live by fishing among the islands of the Archipelago of Chonos, have as coppery a complexion as those who under a burning climate cultivate bananas in the narrowest and deepest vallies of the equinoctial region. We must add, that the Indians of the mountains are clothed, and were so long before the conquest, while the aborigines, who wander over the plains, go quite naked, and are consequently always exposed to the perpendicular rays of the sun. I could never observe that in the same individual those parts of the body which were covered were less dark than those in contact with a warm and humid air. We every where perceive that the colour of the American depends very little on the local position in which we see him." Political Essay on the Kingdom of New Spain, vol. i. p. 140—145.

How does it happen, that the same sun, which makes the African black, tinges the American of a copper colour? and that the dark hue, which might possibly be produced by heat in the equatorial regions, should be found also in the cold and inhospitable tracts of Terra del Fuego, and the most northern part of the continent? The absence of white races can surely not be ascribed to the want of sufficiently cold climates. Bougainville found the thermometer, in the middle of summer, $54\frac{1}{2}°$ in lat. 52°; and Messrs. Banks and Solander, and their attendants, had nearly perished all together from the cold, in an excursion in Terra del Fuego, in the middle of the summer. Two of the servants were actually lost.

Differences in the same Regions.—A very cursory survey of the globe will shew us that the same regions have been occupied by men of different races, without any interchange of characters, in many instances, for several centuries The Moors and Negroes are found together in Africa; Europeans, Negroes, and Americans in North and South America; Celts, Germans, and Slavons in Europe, and even in the same kingdoms of Europe, &c. &c. The distinctions of these different races, except where they have been confused by intermarriages, is just as easy now as it has been in any time, of which we have authentic records.

Permanence of the original Character, when the Climate is changed.—The permanency of the characters of any race when it has changed its original situation for a very different one, when it has passed into other climes, adopted new manners, and been exposed to the action of these causes for several generations, affords the most indisputable proof that these characteristics are not the offspring of such adventitious circumstances. From the numerous examples, in every race, which a slight knowledge of history will furnish, we shall select a few of the most striking.

The establishments of the Europeans in Asia and America have now subsisted about three centuries. Vasquez de Gama landed at Calicut in 1498; and the Portuguese empire in India was founded in the beginning of the following century. Brazil was discovered and taken possession of by the same nation, under Alvarès Cabral in 1500. Towards the end of the fifteenth, and the beginning of the sixteenth century, Columbus, Cortez, and Pizarro subjugated for the Spaniards the West Indian islands, with the empires of Mexico and Peru. Sir Walter Raleigh planted an English colony in Virginia in 1584; and the French settlement of Canada has a rather later date. The colonists have, in no instance, approached to the natives of these countries; and their descendants, where the blood has been kept pure, have, at this time, the same characters as native Europeans. In the hotter situations indeed, as in the warmer countries of Europe, the skin is swarthy; but the children, at the time of birth, and women who are never exposed much to the sun's rays, have all their native whiteness. This observation admits of no exception: in the tint of the skin, the colour and other qualities of the hair, the features, the form of the cranium, the proportions and figure of the body, the European colonists retain all their original characters. The sanguine constitution, with its blue eyes, yellow hair, and fair skin, which is so remarkably different from that of the natives, is nevertheless transmitted without the least alteration from generation to generation.

Negroes have been introduced into the new world for nearly an equal length of time: in the West Indian islands, in the United States, in the various parts of Spanish America, they live under new climates, and have adopted new

new habits. Yet they have ftill woolly hair, black fkins, flat nofe, thick lips, and all the other characters of their race.

The Vandals paffed from Spain into Africa about the middle of the fifth century: their defcendants may be ftill traced, according to Shaw, in the mountains of Atlas, by their white and ruddy complexion, and yellow hair. The change, produced by climate, muft be infinitely fmall, fince it is not yet perceptible after a lapfe of thirteen centuries.

The inhabitants of Perfia, of Turkey, of Arabia, of Egypt, and of all Barbary, may be regarded as the fame race of people, who, in the time of Mahomet and his fucceffors, extended their dominions by invading immenfe territories. In all thefe fituations the fkin retains its native fairnefs, unlefs the tint be changed by expofure to the fun: and the children are invariably fair. "Il n'y a femme de laboureur ou de payfan en Afie (Afia Minor) qui n'a le teint frais comme une rofe, la peau delicate et blanche, fi polie et fi bien tendue, qu'il femble toucher du velours." (Obf. de Pierre Belon, p. 199.) The Arabians are fcorched by the heat of the fun, for moft of them are either covered with a tattered fhirt, or go entirely naked: La Boullaye informs us, that the Arabian women of the defert are born fair, but that their complexions are fpoiled by being continually expofed to the fun. (Voyages de la Boullaye le Gouz, p. 318.) Another traveller remarks that the Arabian princeffes and ladies, whom he was permitted to fee, were extremely handfome, beautiful, and fair, becaufe they are always covered from the rays of the fun; but that the common women are very much blackened by the fun. Voyage fait par Ordre du Roi dans la Paleftine, p. 260.

The Moors, who have lived in Africa fince the feventh century, have not degenerated in their phyfical conftitution from their Arabian progenitors: the fun exerts its full influence on their fkin, but their children are juft as white as thofe born in Europe. They are by no means confined to the northern coaft, but have penetrated, as the prevalence of the Mahometan religion attefts, deeply into the interior: here they dwell in countries, of which the woolly Negro is the native, but have not acquired, in fix centuries of expofure to the fame caufes, any of his characters. The intelligent and accurate Shaw informs us that moft of the Moorifh women would be reckoned handfome even in Europe; that the fkin of their children is exceedingly fair and delicate, and though the boys, by being expofed to the fun, foon grow fwarthy, yet the girls, who keep more within doors, preferve their beauty till the age of thirty, when they commonly give over childbearing. "Les Maures," fays Poiret, "ne font pas naturellement noirs, malgré le proverbe, et comme le penfent plufieurs ecrivains; mais ils naiffent blancs, et reftent blancs toute leur vie, quand leurs travaux ne les expofent pas aux ardeurs du foleil. Dans les villes les femmes ont une blancheur fi éclatante, qu'elles eclipferoient la plupart de nos Européennes; mais les Maurefques montagnardes, fans ceffe brulées par le foleil et prefque toujours à moitié nues, deviennent, méme dès l'enfance, d'une couleur brune qui approche beaucoup de celle de la fuie." (Voy. en Barbarie, tom. i. p. 31.) The teftimony of Bruce is to the fame effect.

That the fwarthinefs of the Southern Europeans is merely the effect of the fun's action on the individual, whofe children are born perfectly white, and continue fo unlefs expofed to the operation of the climate, might be eafily proved of the Spaniards and Portuguefe, the Greeks, Turks, &c. but the fact is too well known to render this neceffary.

The Jews exhibit one of the moft ftriking inftances of peculiar national formation, unaltered by the moft various changes. They have been fcattered, for ages, over the face of the whole earth; but their peculiar religious opinions and practices have kept the race uncommonly pure; accordingly their colour and their characteriftic features are ftill the fame under every diverfity of climate and fituation.

We confider it as fufficiently proved that native differences in general, and particularly that of colour, do not depend on extraneous caufes: we have an obfervation or two to make on fome other points. That the curled hair of the African is not produced by heat appears from its being found, in many fituations, not remarkable for high temperature, as the Moluccas, New Guinea, Mallicollo, Borneo, New Holland, and even in the cold region of Van Diemen's land; as well as from the hot regions of Afia and America being inhabited by a long-haired race. The differences in ftature, again, have been very confidently afcribed to adventitious caufes. Temperate climate, pure air, copious food, &c. have been thought favourable to the full developement of the human frame; while extreme cold, bad and unwholefome food, noxious air, and fimilar caufes, have been thought capable of reducing the dimenfions of the body below the ordinary ftandard. That thefe caufes may have fome effect on individuals we do not deny, although we believe that it is very flight: but the numerous examples of large people in cold countries, and diminutive men in warm climes, induce us to deny altogether its operation on the race. The tall and large-limbed Patagonians, the Tfchutfki, and the North Americans inhabit cold fituations; the Monguls, who are fmall in ftature, live in warm countries.

The foregoing facts and arguments warrant us, as we conceive, in drawing (with Dr. Prichard, Diff. p. 119.), the following conclufions.

1. That climate, manners, and other phyfical and moral caufes, have fome power in modifying the natural conftitution of man, as well as of animals.

2. That the influence of fuch caufes is confined to one generation; and that no alteration produced in this way, or brought about by art or chance, is tranfmitted to the offspring.

3. That all the diverfities of mankind are examples of a propenfity to the formation of natural varieties, common to all animals under certain circumftances, follow the fame laws, and are to be afcribed to the fame caufe.

4. Therefore, that the hypothefis of different fpecies having been originally formed, is unneceffary for the explanation of the phenomenon.

Divifions of Mankind. Arrangement of Man as an Object of Natural Hiftory.—Order, Bimanus. *Genus*, Homo. Erectus, bimanus, inermis, rationalis, loquens: mento prominulo: dentes incifores fupra & infra quatuor: dentes omnes æqualiter approximati; laniarii reliquis longitudine æquales; incifores inferiores erecti. See Blumenbach, Handbuch der Naturgefchichte. *Species*, H fapiens.

Varieties.—As we have fhewn, on the one hand, that there is no circumftance of difference between the varieties of the human race, which does not appear in a ftill greater degree among animals chiefly of the domefticated kinds, arifing from the ordinary fources of degeneration: fo there is no point, whether of colour, countenance, or ftature, which does not pafs by imperceivable gradations into the oppofite character, rendering all thefe diftinctions merely relative, and reducing them to differences in degree. Hence it is obvious, that any divifion of the varieties of the human race muft be in a great meafure arbitrary.

The fingle fpecies then, which the genus Homo contains, is divided by Blumenbach into the five following varieties;

rieties; 1. Caucafian; 2. Mongolian; 3. Æthiopian; 4. American; 5. Malay. The Caucafian, for reafons which will afterwards be mentioned, is regarded as the primitive ftock. This deviates into two extremes moft remote and different from each other; *viz.* the Mongolian on one fide, and the Æthiopian on the other. The two remaining varieties hold the middle places between the Caucafian and the two extremes: that is, the American comes in between the Caucafian and Mongolian; and the Malay between the Caucafian and Æthiopian.

Thefe five varieties may, on the whole, be defined by the following marks and defcriptions. But it is neceffary to obferve, in the firft place, that on account of the multifarious diverfity and gradations of characters, one or two are not fufficient for determining the race, confequently that an union of feveral is required; and, fecondly, that even this combination of characters is fubject to numerous exceptions in each variety. The union of the different races by intermarriages, and the changes of fituation for the purpofes of war and conqueft, that lead to thefe, account for a great deal of this uncertainty. On the whole, however, the following will be found a tolerably clear and correct view of the matter.

1. *Caucafian Variety.*—White fkin, inclining to brown, red cheeks, hair black and of the various lighter colours, head of a fomewhat globular form; oval and ftraight face, with features moderately feparate from each other, expanded forehead, narrow and rather aquiline nofe, and fmall mouth: front teeth of both jaws perpendicular; lips, particularly the lower, gently turned out; chin full and rounded. In fhort, that kind of countenance which accords with our notions of beauty.

It includes all the Europeans, except the Laplanders and the reft of the Finnifh race; the Weftern Afiatics, as far as the river Ob, the Cafpian fea, and the Ganges; that is, the proper Tatars, the Georgians, Circaffians, Mingrelians, &c. the Perfians, Arabians, Syrians, the Turks; the Northern Africans, as the people of the Barbary ftates; the Egyptians and Abyffinians.

The name of this variety is derived from mount Caucafus, becaufe in its neighbourhood, and particularly towards the fouth, we meet with the moft beautiful race of men in the world, *viz.* the Georgians. From the accounts of numerous travellers, who all agree on this fubject, we felect the remark of Chardin: "The blood of Georgia is the fineft in the eaft, and I may fay in the world. I have not obferved a fingle ugly countenance in that country in either fex; but have feen numerous angelic ones. Nature has beftowed on the women graces and charms, which we fee in no other place. It is impoffible to look at them without loving them. More beautiful countenances, and finer figures, than thofe of the Georgian women, cannot even be imagined." Voyage en Perfe, t. i. p. 171.

Many reafons induce us to believe, that the primitive form of the human race, was that which we have defcribed as belonging to the Caucafian variety; and of which the Georgians, Turks, Greeks, and fome Europeans, exhibit now the fineft fpecimens. This race has the moft beautifully formed cranium, (fee Cranium, and *Anatomy of the Cranium, Pl.* 1. *fig.* 1.) from which, as from a middle and primitive configuration, the other forms defcend by a moft eafy and fimple gradation, on the one hand to the Mongolian, and on the other to the Æthiopian variety. The proportions of the body in general are the moft beautiful in this race, and their minds are the moft acute, fo that nearly all the arts and fciences have been difcovered by them. They occupy the middle regions of the globe, while the extremities are filled by others. The moft ancient, and moft early civilized nations have belonged to this variety. To this form alfo, according to the obfervation of Blumenbach, there is a difpofition to return in the other races; as may be obferved in the South fea iflands, and fome parts of Africa; while this does not eafily deviate into the dark coloured varieties.

If we admit the Caucafian to have been the primitive form of man, are we to fuppofe, that the eyes were blue, and the hair yellow or red, or that both were black? we can have little hefitation in adopting the latter opinion, fince that formation belongs to all of this race except the Germans, which have occupied only the more diftant regions. It forms, too, the middle colour of the human race, and appears often in fcattered inftances among the other varieties. Moreover, yellow or tawny breeds occur among animals, as in the rabbit and cat, by degeneration from the native colour.

In this Caucafian variety, Blumenbach and moft others include the German race; but Dr. Prichard affigns it a feparate place under the name of "conftitutio Germanica aut fanguinea." The form and proportions of the cranium, face, and body in general, are the fame as in the preceding; the features perhaps are rather lefs acute, and more rounded, and the eyes fmaller. The whole ftature and the limbs are rather larger. But the moft prominent diftinctions are in the very white fkin, approaching to rednefs; in the yellow or red hair, and the blue eyes.

2. *Mongolian Variety.*—Olive colour; black, ftraight, ftrong, and thin hair, fcarcely ever curled; head of a fquare form; broad and flattened face, with the features running together; the glabella (interval between the eye-brows) flat and very broad; nofe fmall and flat; rounded cheeks projecting externally; narrow and linear aperture of the eyelids; eyes placed very obliquely; flight projection of the chin; large ears, thick lips. The ftature, particularly in the countries near the North pole, is below that of the Europeans.

This includes the reft of the Afiatics (excepting the Malays); the Finnifh races of the colder parts of Europe, as the Laplanders, &c.; and the tribes of Efquimaux, extending over the northern parts of America, from Beering's ftrait to the extremity of Greenland.

The Mongolians, widely fcattered over the continent of Afia, have generally, but erroneoufly, been included with fome of very different origin and formation, under the name of Tartars; whereas the laft-mentioned tribes, properly fo called, belong to the firft divifion of the human race. The Calmucks, and other Mongolian nations, which overran the Saracen empire, under Zenghis Khan, about the middle of the thirteenth century, and had entered Europe, are defcribed in the "Hiftoria Major" of Matthew Paris under the name of Tartars, whereas that name (or, as it fhould be fpelled, Tatars) properly belongs to the weftern Afiatics, who had been vanquifhed by the Monguls. The error, however, arifing from this fource, has been propagated down to the prefent day, fo that in the works of the moft approved naturalifts, as Buffon and Erxleben, we find the characters of the Mongolian race afcribed to what they call the Tartars.

The Tatars indeed are connected by the Kirgufes, and neighbouring tribes, to the Monguls, in the fame way as the latter are joined by the inhabitants of Thibet to the Indians; by the Efquimaux, to the Americans; and by the Philippine iflanders, with the Malays.

3. *Ethiopian Variety.*—Black fkin and eyes; black and woolly hair; head narrow, and compreffed laterally; arched forehead; cheek-bones ftanding forwards; prominent eyes; thick

thick nose, confused with the extended jaw; alveolar arch narrow, and elongated anteriorly; the upper front teeth projecting obliquely; the lips, and particularly the upper one, thick; the chin receding; knees turned in in many instances. The remaining Africans, besides those classed in the first variety, belong to this.

The striking peculiarities of this variety, and particularly the very great difference between its colour and our own, have led many persons to adopt the opinion of Voltaire, who had not a sufficient knowledge of physiology and natural history to determine the question, that the Africans belong to a distinct species. We have shewn, in the preceding divisions of this article, that there is no one character so peculiar and common to the Africans, but that it is found frequently in the other varieties, and that negroes often want it; also, that the characters of this variety run by insensible gradations into those of the neighbouring races, as will be immediately perceived by comparing together different tribes of this race, as the Foulahs, Wulufs, and Mandingoes, and carefully noting how in these gradational differences they approach to the Moors, New Hollanders, &c.

Again, great stress has been laid on the fact, that the negroes resemble more nearly than the Europeans, the monkey tribe; the fear of being drawn into the family, even as distant relations, has we believe induced many to place our black brethren in a distinct species; while others have brought forwards this approximation to the simiæ, with the view of degrading the African below the standard of the human species, and thereby palliating the cruel hardships under which he groans in the islands and continent of the new world.

It is undoubtedly true, that in many of the points, wherein the Æthiopian differs from the Caucasian variety, it comes nearer to the monkies; *viz.* in the greater size of the bones of the face, compared to those of the cranium; in the protuberance of the alveoli and teeth, recession of the chin, form of the ossa nasi, position of the foramen magnum occipitale, outline of the union of the head and trunk, relative length of the humerus and ulna, &c. This resemblance is most unequivocally admitted by Soemmerring; über die körperl. verschied. pref. p. 19, and § 69. It appears to us, that this fact is not very important; if there are varieties of bodily formation among mankind, some one of these must approach nearer to the organization of the monkey than the others; but does this prove, that the variety in which the conformity occurs, is less man than the others? The solidungular variety of the common pig is more like the horse than other swine; do we hence infer, that the nature of this animal in general is less porcine, or more like that of the horse, than that of other pigs? The points in which the Negro differs from the European, are trivial and few, and do not touch upon those important characters which separate man in general from the animal world; the erect attitude, the two hands, the slow developement of the body, the use of reason, and consequently perfectibility, are attributes common to both.

That very little importance can be attached to the general observation of the resemblance of the negro and monkey, founded on external appearance, may be clearly inferred from this fact, that the same remark has been made, even by intelligent travellers, of particular people in the other varieties. Regnard concludes his description of the Laplanders with these words: "voilà la description de ce petit animal qu'on appelle Lapon, et l'on peut dire qu'il n'y en a point, après le singe, qui approche plus de l'homme. (Œuvres, t. i. p. 71.) An Esquimau, who was brought to London by Cartwright, when he first saw a monkey, asked "Is that an Esquimau?" His companion adds, "I must confess, that both the colour and contour of the countenance had considerable resemblance to the people of their nation." Nic. del Techo calls the Caaiguas of South America, "tam simiis similes, quam hominibus," Relat. de Caaig. gente, p. 34; and J. R. Forster, in the observations on his journey round the world, asserts "that the inhabitants of the island Mallicollo, of all the people whom I have seen, have the nearest relationship to the monkies."

4. *American Variety.*—Red colour; black, straight, strong, and thin hair; short forehead; deep eyes; nose somewhat flattened, but prominent; a broad, but not flattened face, with the cheeks standing out, and the different features projecting distinctly and separately; the forehead and vertex often deformed by art. This variety includes all the Americans, with the exception of the Esquimaux.

Several idle tales have been propagated, concerning the distinguishing characters of this race. Some have denied the existence of a beard in the male, and that of the menstrual discharge in the female; and others have ascribed an uniform colour and countenance to all the inhabitants of this vast continent. The concurring testimonies of all accurate modern travellers, prove clearly that the Americans have naturally beards; and that the report of their deficiency has arisen from their practice of eradicating it. See the general observations in this article on the beard.

The fabulous report of the American women not being subject to the menstrual discharge, seems to have arisen from the European travellers, who saw numerous females almost naked, having observed nothing of it. Two circumstances will account for this, according to Blumenbach: "partim nempe quod apud istas Americæ gentes feminæ quamdiu menstruatæ sint, felici prejudicio pro venenatis quasi habeantur, inque remotioribus tuguriolis e hominum conspectu remotæ tamdiu benefico ipsis otio fruantur; partim vero etiam laudatam ipsarum corporis munditiem et modestam crurum commissuram eo conferre ut nulla catameniorum vestigia in oculos incurrant, annotatum est." De Variet. p. 313.

The redness of the skin is not so constant, but that it varies in many instances towards a brown, and approaches likewise in some temperate situations to the white colour. Cook states, that the natives about Nootka Sound are little inferior in fairness to Europeans; and Bouguer makes the same observation of the Peruvians on the Andes. It is also fully ascertained at present, that the Americans possess the same varieties of feature which are observed in the other races.

5. *Malay Variety.*—Brown colour; hair black, soft, curled, and abundant; head moderately narrow, and forehead slightly arched; nose full and broad towards the apex; large mouth; upper jaw rather prominent; the features, when viewed in profile, projecting and distinct. The inhabitants of the peninsula of Malacca, of the South sea, Ladrone, Philippine, Molucca, and Sunda islands, are arranged under this division.

As the Americans in their national characters, hold the middle place between that middle variety of the human race, which we have called the Caucasian, and one of the extremes, *viz.* the Mongolian; so the Malay forms the connecting link between the Caucasian and the Ethiopian. The name of Malay is given to it, because most of the tribes which it includes, as those which inhabit the Indian islands near Malacca, the Sandwich, Society, and Friendly islands, also those of Madagascar, and thence to Easter island, use the Malay language. See Hawkesworth's collection. v. iii. p. 373;

p. 373; Cook's Voyage to the northern Hemiſphere, v. iii. p. 520; Marſden, in Archæologia, v. vi. p. 154.

Arrangements of other Naturaliſts.—The great number and diverſity of the objects, the contradictory, imperfect, and confuſed accounts which we poſſeſs of many of them, render all claſſifications very arbitrary; hence very different diviſions have been adopted by different ſyſtematic writers.

Of Linnæus.—This naturaliſt places the genus Homo in his order Primates, and gives him the company of the monkies, lemurs, and bats; the characters of the order are, "dentes primores inciſores, ſuperiores quatuor, paralleli: mammæ pectorales binæ." He admits three ſpecies:

I. Homo Sapiens; Diurnus, varians cultura, loco. Corpus erectum nudum, pilis raris remotiſſimis aſperſum, ſubſexpedale.

Varieties. *Ferus*; Tetrapus, mutus, hirſutus.

Americanus; Rufus, cholericus, rectus.
Pilis nigris, rectis, craſſis; naribus patulis; facie ephelitica; mento ſubimberbi.
Pertinax, contentus, liber.
Pingit ſe lineis dædaleis rubris.
Regitur conſuetudine.

Europæus; Albus, ſanguineus, toroſus.
Pilis flaveſcentibus prolixis. Oculis cæruleis.
Levis, argutus, inventor.
Tegitur veſtimentis arctis.
Regitur ritibus.

Aſiaticus; Luridus, melancholicus, rigidus.
Pilis nigricantibus. Oculis fuſcis.
Severus, faſtuoſus, avarus.
Tegitur indumentis laxis.
Regitur opinionibus.

Afer; Niger, phlegmaticus, laxus.
Pilis atris, contortuplicatis. Cute holoſericea, naſo ſimo. Labiis tumidis. Feminis ſinus pudoris; mammæ lactantes prolixæ.
Vafer, ſegnis, negligens.
Ungit ſe pingui.
Regitur arbitrio.

Monſtroſus; Solo et arte variat:
Alpini parvi, agiles, timidi.
Patagonici, magni, ſegnes.
Monorchides, ut minus fertiles; Hottentotti.
Junceæ puellæ abdomine attenutoa; Europeæ.
Macrocephali capite conico: Chinenſes.
Plagio-cephali capite antice compreſſo: Canadenſes.

II. H. Troglodytes; Nocturnus: habitat in Æthiopiæ conterminis, in Javæ, Amboinæ, Ternateæ ſpeluncis, in monte Ophir Malaccæ.

This ſeems to be a medley, compoſed of the characters of the leucæthiopes, and ourang-outangs.

III. Homo lar; brachiis longitudine corporis.

This is the gibbon, or long-armed monkey.

Of Buffon.—1. Lapponic or polar: 2. Tataric (Mongolian): 3. Southern Aſiatic: 4. European: 5. Æthiopian: 6. American.

Of Erxleben (Syſt. Regn. Anim. Mammalia).

Homo; Dentes primores inciſores, ſupra et infra quatuor: laniarii conici, longitudine æquales approximati. Manus in palmis, non in plantis. Mammæ pectorales binæ. Cauda nulla.

Var. 1. *Lappo*; Parvus, toroſus, albus, macrocephalus, facie plana lata, maxilla inferiore prominula acuminata vix barbata, oculis parvis profundis nigro fuſcis, naſo parvo obtuſo, buccis inflatis, ore magno, labiis craſſis, auriculis magnis, pilis rectis nigris craſſis, brachiis longioribus, manibus plantiſque minoribus.

Habitat in borealibus Europæ, Aſiæ, Americæ.

2. *Tatarus* (Mongolian): Mediocris olivaceus, facie plana lataque, fronte rugoſa, oculis parvis profundis nigris, ſuperciliis largis, naſo brevi craſſo, labiis tumidis, mento prominente acuminato, barba rariore, dentibus longioribus interſtitiis majoribus, pilis nigris craſſioribus, femoribus craſſis, cruribus brevioribus.

Ab Imao verſus circulum arcticum in Aſia.

3. *Aſiaticus*; Mediocris, luridus, rigidus, pilis nigricantibus, oculis parvis nigris, naſo depreſſo, labiis craſſis, dentibus antrorſum verſis.

Trans Gangem.

4. *Europæus*; Mediocris albus toroſus, pilis flaveſcentibus prolixis, oculis cæruleis vel fuſcis, labiis tenuioribus.

5. *Afer*; Magnus niger, cute holoſericea ex reticulo mucoſo Malpighiano craſſiore nigroque, pilis atris, contortuplicatis, oculis nigris viridibuſve, naſo ſimo, labiis tumidis, ventre inflato, mammis lactantibus prolixis.

Præcipue in Africa occidentali.

6. *Americanus*: Mediocris rufus, pilis nigris rectis craſſis, facie ephelitica, fronte parvo, oculis nigris, naſo aquilino, naribus patulis, mento ſubimberbi.

Meiners adopts two chief diviſions (haupt-ſtämme), the handſome and the ugly (ſchöne and häſsliche); of which the former is white, the latter dark-coloured (dunkel färbige). The handſome diviſion includes the Celtic, Slavonic, and Oriental people: the latter are the Armenians, Syrians, Arabians, Ægyptians, and others in the north-weſt of Africa, the Georgians, Circaſſians, Perſians, the inhabitants of Hindooſtan, Bucharia, and the neighbouring parts, and a large part of Siberia; under the ugly diviſion come all the reſt of mankind. Grundriſs, chap. ii.

Of J. R. Forſter.—1. Europeans, Aſiatics on the weſt of the Ob, the Caſpian, and the Ganges, Africans of Egypt, Nubia, Ethiopia, Cyrene, Tripoli, Tunis, Algiers, Fez, Morocco, and all the country as far as the river Sanhaga (Senegal?), in ſhort the Caucaſian of Blumenbach.

White, yellowiſh-brown, or even blackiſh colour; long face with well-formed noſe and lips; yellowiſh-white, reddiſh-brown, or black hair, which is long and particularly curled in locks.

2. All the Aſiatics beyond the Ob, the Caſpian and the Ganges; all the Americans from Unalaſchka and Cook's river northwards to the northern icy ocean, and particularly Labrador and Greenland; all the inhabitants of the coaſts in the Molucca, Philippine, weſtern South ſea iſlands, and New Zealand.

Yellowiſh-brown colour nearly univerſal; broad flattened faces with high cheek bones. Narrow opening of the eyelids, and internal angle of the eyes depreſſed towards the noſe (that is ſituated lower down than the external). Hair univerſally black, long, and generally ſmooth and ſtiff.

3. Africans or Negroes, and the inhabitants of the internal parts of various Indian and South ſea iſlands; and all New Holland.

Black with the under part of the face projecting: thick lips, broad flat noſes, and woolly curled hair.

4. Americans, except thoſe in the ſecond variety.

Copper red colour; noſe thin, long and pointed; hair black, ſmooth, and ſtiff.

Of Dumeril.—The firſt family of his claſs of mammalia are the Bimanes, which have theſe characters: Mammiferes

a membres

à membres separés onguiculès; aux trois fortes de dents, et à pouces oppofables aux mains feulement. He adopts the five varieties of Blumenbach, calling the firft Caucafian or European-Arab; and adds a fixth, under the name of Hyperboréenne, which includes the men dwelling near the north pole in Europe, Afia, and America. Zoologie Analytique, p. 7.

The arrangements of fome other authors may be found in Blumenbach de Varietate, fect. iv. § 83; and in Ludwig's Grundrifs, chap. vii.

It would be defirable to inveftigate the original abode of mankind, to afcertain the fituations of the different races from the earlieft authentic accounts, and to follow their migrations until we could trace them to the fituations which they now occupy. To accomplifh any thing fatisfactory on this head, a very exact knowledge of the bodily characters of the races fhould be combined with exact hiftorical information, and an acquaintance with languages, thofe living and unexceptionable teftimonies of the affinities of people. On the former of thefe points, although it might at firft appear that the facts are eafily acceffible, our data are ftill extremely imperfect; and hiftory furnifhes too feeble a light to guide us through the thick darknefs that involves the origins of nations. We feel ourfelves unable to bring forward any thing fufficiently clear and well-grounded to bear with much force on the principal points, which we have endeavoured to illuftrate in this article. A fhort fketch of the fubject is given in Dr. Prichard's Differtation.

Principal Works on the Natural Hiftory of Man.—Buffon's natural hiftory of man; his obfervations on mules, on the degeneration of animals, on wild and domeftic animals, and indeed his natural hiftory in general, contain a fund of moft valuable information.

Blumenbach, de generis humani varietate nativa, ed. 3. Götting. 1795; his Decades craniorum diverfarum gentium illuftratæ, 1—4; 4to. Gött. 1790—1800; his Beyträge zur naturgefchichte, Gött. 1790. 12mo.; his Handbuch der naturgefchichte, ed. 6. Gött. 1799; and his Abbildungen naturhiftorifcher gegenftände; more particularly part i.

Zimmermann, Geographifche gefchichte der menfchen und der allgemein verbreiteten vierfuffigen Thiere, &c. Leipfic, 1778—1783, 3 vols. 8vo.

Soemmerring, über die körperliche verfchiedenheit des Negers vom Europäer: 8vo. Frankfort, 1785.

Meiners, Grundrifs der gefchichte der menfchheit; 12mo. Lemgo, 1793.

J. C. Prichard, Difputatio inauguralis de hominum varietatibus, 8vo. Edinb. 1808.

The above are the beft fources of information: thofe which follow are not fo good, or not fo well known to the writer of this article.

Beddome de hominum varietatibus et earum caufis, Lugd. Bat. 1777.

J. Hunter diff. de hominum varietatibus, Edinb. 1775; in Webfter's collection.

Lord Kaimes' Sketches of the Hiftory of Man.

Smith, Effay on the caufes of the variety of complexion and figure in the human fpecies, Philadelphia, reprinted London 1789.

Meiners, Hiftorifches magazin, Götting.

Jofephi, Grundrifs der naturgefchichte der menfchen, Hamburgh, 1790.

J. Kant, von den verfchiedenen racen der menfchen, in Engel's Philofoph fur die welt, 1779, part. ii.

Wünfch, Kofmologifche unterhaltungen.

J. R. Forfter's and Klügel's Abbildungen merkwürdiger Völker und Thiere; Halle, 1793, 8vo.

Ludwig, Grundrifs der naturgefchichte der menfchen fpecies, 8vo. Leipfic, 1796.

G. Forfter und Sprengel, Beyträge zur Völker und Länder-kunde.

Breitenbauch vorftellung der vornehmften Völkerfchaften der welt nach ihrer abftammung, verbreitung, und fprachen, nebft einer charte, Leipfic, 1786, 8vo.

Breitenbauch entwurf einer gefchichte des vornehmften Völkerftämme des alten und neuen Zeitalters; Leipfic, 1791, 8vo.

Breitenbauch verfuch einer erd-befchreibung der fechs welt-theile, nach den ftammen ihrer regenten und bewohner nebft Karten, Leipfic, 1793, 8vo.

White, account of the regular gradation in man and animals, &c. London, 4to. 1799.

Man *of the Wood.* See Ourang-outang.

Man, in *Geography*, an ifland fituated in the Irifh fea, at the diftance of 30 nautical miles from St. Bees-head in Cumberland, and 27 from Strangford in Ireland. The latitude of the middle of this ifle is 54° 7′ north, and its whole extent is about thirty miles in length, and ten in breadth. The whole is divided into two diftricts, which are fubdivided into feventeen parifhes. Concerning the etymology and derivation of its name, different opinions have been offered. Bifhop Wilfon fuppofes it to be derived from the Saxon word *mang*, fignifying *among*, in allufion to its pofition, as furrounded by other territories, and this is juftly regarded as a very probable conjecture, its prefent Manks appellation, Manning, ftill retaining the fame meaning. Some other authors affert, that it plainly comes from Mona, a word which they imagine, but without fufficient authority, to have been ufed by Cæfar to denote this ifland. Ptolemy ftyles it Monaeda, or the more remote Mona, to diftinguifh it from Anglefea, the Mona of Tacitus. Pliny calls it Menania, Nennius Eubonia, and Orofius Mevania.

Hiftory.—According to tradition, the original inhabitants of Man were a colony from Britain. The primitive form of government eftablifhed by them was, no doubt, that of the Druids, whofe authority, in thefe diftant times, was acknowledged by almoft all the kingdoms of northern Europe. The inftitutions flowing from the Druidical fyftem, feem to have been preferved here, even fo late as the clofe of the fourth century, when the light of Chriftianity, under the direction of St. Patrick, penetrated the gloom of their umbrageous oaks, and by inducing new opinions, gave birth to new regulations in civil as well as in religious polity. At this period Boetius and other writers affert that the Ifle of Man was celebrated as the "fountain of all pure learning, and the acknowledged refidence of the mufes." Nennius fays that it was held by Buile, a Scot, in the reign of Arcadius and Honorius; but Sacheverel refers his government to a later era. St. Patrick appointed Germanus bifhop and ruler of it, and after his death two other bifhops fucceeded him. St. Maughold, who had been captain of a band of robbers in Ireland, fucceeded them, and from his period the bifhops retained the government, till the coming of a king, called Orry, who continued for fome years lord of Man. In the year 580 Brennus, defcended from the blood-royal of Scotland, obtained the fupreme authority. This prince having led an army to the affiftance of his uncle, loft his life in an action with the enemy, on which event this ifland appears to have been annexed to the Scottifh dominions. About 614 it was conquered by Edwin, king of Northumberland, from whofe reign a blank occurs, even in tradition, till the arrival of a fecond Orry, in the tenth century. This monarch was ſon of a king of Denmark and Norway, who, after reducing the Orcades and Hebrides, fixed his ſeat of government in the Iſle of Man, where he reigned long and proſperouſly, as an independent king. In his reign, the houſe of Keys, which will be more particularly noticed hereafter, was eſtabliſhed, as the conſtitutional parliament of the iſland. Guttred, the ſon of Orry, was diſtinguiſhed as the Numa of his ſmall kingdom, having devoted his whole attention to the civilization and welfare of his ſubjects. Reginald, who ſucceeded, was not leſs noted for his vices, which ultimately occaſioned his aſſaſſination by the brothers of a lady whom he had diſhonoured. Olave, the next prince of Man, unjuſtly ſuffered as a traitor, at the court of the king of Denmark, for having aſſumed the crown without his approbation. Olain, his brother, became his ſucceſſor, and after an equitable reign, left his diadem to his ſon Allen, a tyrannical prince, who was poiſoned. Maccon next took poſſeſſion of the ſovereignty, but having refuſed to pay homage to the Engliſh crown, he was depoſed by Edgar, but was afterwards reinſtated in his former dignity with additional power. The Engliſh monarch is likewiſe ſaid to have appointed him admiral of an immenſe fleet, (amounting, according to Matthew of Weſtminſter, to 4800 ſail, but this number is certainly incredible.) with which he ſailed, twice a year, round the whole Britiſh iſlands, in order to protect their coaſts from the piracies of the Danes and Normans. How long this great man continued to reign is uncertain, but towards the middle of the eleventh century we find Goddard, the ſon of Syrach, upon the throne, whoſe barbarous conduct rendered him extremely abhorrent to his ſubjects. Fingal, his ſon, ſucceeded, who, on the other hand, was greatly beloved for his mildneſs and generoſity. In his reign, Godred Crovan, a Norwegian chief, arrived with a numerous fleet, and though twice defeated, at laſt obtained a deciſive victory, the king and his principal officers being ſlain in the battle. This event occurred in the ſame year in which the conqueſt of England was effected by William of Normandy, and in conſequence the whole iſland ſubmitted to the ſuperior fortune of Godred. During his government the monks greatly diſtinguiſhed themſelves in war. He firſt made a ſucceſsful predatory incurſion into Ireland, and afterwards ſubdued the Hebrides, and ſo effectually kept the Scots in awe by the power of his navy, that, to uſe the metaphorical language of the Ruſhen monks, "they durſt not, when building a ſhip or boat, drive more than three nails into it." Godred had three ſons, the eldeſt of whom, named Lagman, ſucceeded to the throne. Harold, the ſecond ſon, was long in rebellion againſt his brother, but being at laſt taken priſoner, had his eyes put out, and was otherwiſe mutilated.

Lagman afterwards repenting of this cruel conduct, was overwhelmed with ſorrow, renounced his kingdom, and as an expiation of his guilt, made a pilgrimage to Jeruſalem, where he died in 1089. Olave, his youngeſt brother, being yet a minor, the inhabitants of Man ſent a deputation to Murchand O'Brien, king of Ireland, requeſting him to ſend over ſome perſon of royal extraction to govern them till he ſhould come of age. Accordingly this monarch nominated Donald Tade, who governed with ſuch barbarity and extortion, that the indignant natives expelled him from the iſland within three years. The chiefs then elected Macmarus, but that event, notwithſtanding the clemency of his rule, gave birth to a conſpiracy againſt him, and in the battle which it occaſioned, both he, and earl Oughter, the leader of the conſpirators, fell. According to the Manks tradition, the northern men had nearly accompliſhed the victory, when the women of the ſouth ſide flew with ſuch reſolution to the aſſiſtance of their huſbands, as to turn the tide of fortune in their favour. The Chronicon-Manniae, however, aſcribes the victory to the inhabitants of the northern diſtrict. About this time, Magnus, king of Norway, having reſigned his own throne on account of an abſurd ſuperſtition, fitted out an army, with which he made himſelf maſter of the Orcades and Hebrides, as well as of the Iſle of Man, where he landed the day ſucceeding the battle, and received the ſubmiſſion of the Manks without a conteſt. Here he eſtabliſhed his ſeat of government, and after reigning ſix years, made a deſcent upon Ireland, where, having unwarily left his ſhip, he was ſurrounded and ſlain, in the year 1102. During theſe tranſactions, Olave, the ſon of Godred, reſided in great favour at the court of Henry I. of England. Upon the death of Magnus, however, the chiefs of Man immediately diſpatched meſſengers to offer him the crown, which he readily accepted. Aſcending the throne, to the great ſatisfaction of the people, he concluded treaties with all the neighbouring monarchs, and enjoyed profound peace for forty years of his reign. In 1142, however, during the abſence of his ſon Godred, whom he had ſent to Norway to do homage for the crown of Man, the three ſons of his brother Harold landed on the iſland, and demanded one half of his kingdom. Olave, willing to pacify them, promiſed to ſubmit the matter to his council, and appointed a place of meeting for that purpoſe, near Ramſey haven. The king, with his retinue, placed himſelf on one ſide, while his nephews, with their followers, ſeated themſelves on the other. At this moment, Reginald, one of the princes, pretending to ſalute the king, ſuddenly raiſed his ſhining battle axe, and cut off the head of his aged and venerable uncle at one blow. A general ſlaughter of the nobility enſued, and the ſubjugation of the whole iſland, which the three brothers divided among themſelves. In the ſame year they collected a fleet, and landed in Galloway, but were defeated with great ſlaughter. Juſt at this time Godred returned from Norway, and the inhabitants crowding to his ſtandard, the uſurpers deemed it adviſable to ſubmit to his authority, without hazarding a battle. whereupon Reginald was condemned to death, and the other two had their eyes put out. Godred, when he aſcended the throne, was in the bloom of youth and manly intelligence, majeſtic in ſtature, magnanimous in his ſentiments, and heroic in his actions. Theſe qualities uniting with the recollection of his father's virtues, obtained him, not only the love of his own ſubjects, but the eſteem of all the neighbouring nations. In the third year of his reign the fame of his merit induced the chief nobility of the province of Leinſter to elect him their ſovereign. Murchand, king of Ireland, oppoſed his acceſſion, but being defeated, Godred ſeated himſelf on the throne to which the ſuffrages of the people had called him. His abſence, however, excited conſiderable diſcontent in Man, which probably induced him, upon his return, to act ſomewhat in a deſpotic manner towards ſeveral of his nobility. One of them, named Thorfinus, a powerful and ferocious chief, fled to Summerled, thane of Argyle, in Scotland, who had married one of the daughters of Olave, and prevailed upon him to invade the weſtern iſles, then part of the dominions of Godred. Theſe being reduced, he ſailed with a large fleet to attempt the conqueſt of Man, but being met at ſea by his brother in law, alſo at the head of a powerful armament, a dreadful battle enſued, which terminated in a peace, by which Godred retained Man, but ceded the other iſlands to Summerled. This event happened in 1156, but two years ſubſequent, the latter broke the treaty, and invaded Man with a fleet of 53 ſail, defeated Godred, who ſought refuge in Norway, and compelled the whole iſle to ſubmit to his ſovereignty. This ſucceſs ſo puffed up the ambition of Summerled, that he projected

jected the conquest of Scotland, and accordingly made a descent upon Renfrew with that intention, but was defeated in the first engagement, himself and his son being among the number of the slain. About the same time, Reginald, one of the illegitimate sons of Olave, having raised a party, invaded Man, and though opposed with great bravery by the Manks people, succeeded in defeating them by the treachery of one of their generals. His power, however, was but of short duration, for only four days after the commencement of his reign, Godred arrived from Norway with a large army, attacked and took prisoner the usurper, and was hailed by his subjects with the most cordial expressions of attachment. In the residue of this monarch's reign, mention is first made of the pope's influence in Man, his apostolic majesty having sent over from Ireland his legate, Vivian, who compelled the king to re-marry his queen, Phingola, according to the forms of the Romish church. Godred died in 1187, the latter years of his life being spent in perfect tranquillity, and left Olave, his only legitimate son, heir to his kingdom. Reginald, one of his natural sons, however, was appointed king during Olave's minority. This monarch, in 1192, fought a severe battle in the isles with Engus, the son of Sommerled, in which he was defeated with considerable loss. In 1203, he invaded Ireland, but was here unsuccessful also. In 1210, the Isle of Man was plundered by an English earl, named Fulco, during his absence on a visit to his more northern dominions. But notwithstanding these unfavourable circumstances, Reginald was enabled to retain the government, even after Olave, the rightful owner, had attained the years of maturity. But battles ensued, and the latter ultimately ascended the throne, and reigned till his death, which happened in 1237, when his son Harold was fourteen years of age. Having refused to appear at the court of the king of Norway, his territories were invaded by a Norwegian army, under Gospatrick and Gillchrist, who converted the tributes of the country to the service of their own sovereign; but Harold, being at length induced to submit, sailed over to Norway, and, performing the usual homage, was confirmed in the possession of all the islands which his predecessors had enjoyed. On his return home, he entered into treaties with the kings of England and Scotland. To the former he paid a visit, and received from him the honour of knighthood, and other distinguished marks of his royal favour. Soon after he sailed from Norway to espouse the daughter of that monarch, offered to him in marriage by her father, but both he and his princess perished by shipwreck, when on their way back. His brother, Reginald, succeeded, who was slain only a few days after his accession to the throne by Yvar, a knight. Harold, the son of Godred Don, now assumed the title of king, but was soon obliged to surrender his usurped authority to Magnus, the son of Olave, who, as rightful heir, had obtained the sanction of the Norwegian monarch. This prince was the last sovereign of the Norwegian race in Mona. His death happened in 1268. At this period, the king of Norway finding himself unable to afford protection to his distant dominions, agreed to surrender the western islands to Alexander III., king of Scotland, from the dominions of whose ancestors they had been originally wrested by the Norwegian arms. This enterprising monarch soon after extended his authority over the island of Man also, and vested the government in thanes, or lieutenants. These behaving with great oppression towards the inhabitants, so exasperated the Manks, that they formed the resolution of exterminating the Scots, or perishing in the attempt. From this bloody purpose, however, they were restrained by the influence of their bishop, who proposed, in imitation of the warriors of Rome and Alba, that the future fate of their country should be decided by a contest between select combatants. This proposal being eagerly embraced by both parties, thirty heroes were chosen on each side, and a vale was appointed as the scene of the conflict. The two nations covered the opposite mountains in anxious expectation, the one of confirming their conquests, and the other of regaining their former independence. The battle was long and heroically fought, but at length the Scots prevailed, though their thane, and five and twenty of their combatants, paid the forfeit of their lives for the glory of their country. After this period, no attempt seems to have been made by the Manks to regain their liberty, but their island now became the theatre of contests between Scotland and England. William de Montacuto, a descendant of one of the Manks monarchs, having landed here with a body of English troops, forced the Scots to retire to their own country. In the reign of king Edward II. this island was bestowed on Gaveston, who was created earl of Cornwall. In 1340, it was recovered to the Scots by their heroic king, Robert Bruce, and continued in their possession till the earl of Salisbury, under the sanction of Edward III., wrested it again from their authority, and sold it to William Scroop, who was chamberlain to the king. On Henry's gaining possession of the throne, he granted the Isle of Man to the earl of Percy, who afterwards rebelling against his sovereign, had his estates forfeited by an act of attainder, but they were all afterwards restored, with exception of this island, which was bestowed on sir John Stanley and his successors for ever. In his reign, the laws of Man, which had hitherto been concealed in the bosoms of the deemsters, or judges, were first publicly promulgated, and committed to writing. For this purpose, the sovereign convened the entire body of the people at the Fynwald, where he himself attended, invested in all the insignia of royalty. All things being in readiness, the venerable deemsters rose, and, with an audible voice, alternately published to the assembly several laws, which, though more favourable to the monarch than to his subjects, were received with reiterated applause. From this period, the royalties and revenues of Man descended regularly, and without molestation, from ancestor to heir, till the time of William VI., earl of Derby, against whose title some objections were started and legally removed. To put the question beyond doubt, however, a new grant was obtained from James I., which afterwards received the sanction of parliament. It should be observed, that the fifth descendant of this line resigned the title of king, and assumed that of lord of the island, conceiving it to be more honourable to be esteemed a great baron than a petty and dependent monarch. In the time of the civil wars, Man held out for the king till near the close of that unhappy contest, when it was surrendered to the parliamentary forces. It was now granted to lord Fairfax, but upon the accession of Charles II. it was restored to the earl of Derby, son of him who had been beheaded at Bolton. In the same family it continued till the year 1735, when it became the inheritance of James, the second duke of Athol, as grandson of Sophia, youngest sister of that earl.

Before this period, the vast extent of the contraband trade carried on between this island and Great Britain, attracted the serious attention of the government, and an act was passed in 1726, authorising the lord of Man to resign his royalties for a pecuniary compensation; but no sale was effected till the 7th of March, 1765, when John, duke of Athol, resigned all his regal privileges and immunities for the sum of 70,000*l*. An annuity has since been granted by parliament, for the joint lives of himself and his duchess, as an additional

 compensation

compenſation for the loſs he was ſuppoſed to have ſuſtained by this tranſaction, which has, in no ſmall degree, ſecured the revenues of the Britiſh iſlands.

The *conſtitution* and *government* may be partly inferred from the preceding narrative. About the fifth century the government became a deſpotic and feudal monarchy. In the tenth, the foundation was laid for a new dynaſty called the Houſe of Keys, whereby the inhabitants were allowed to chooſe ſixteen repreſentatives, who, with eight from the Iſles, were to form the legiſlature. Theſe repreſentatives were called Taxiaxes, but neither the period of their election, nor the preciſe power with which they were inveſted, can now be aſcertained. It is probable, however, that their privileges were very limited, and that, in reality, they were mere nominal adviſers, all ſubſtantial power being veſted in the perſon of the monarch. Indeed, no mention is made of any interference on the part of this aſſembly in public affairs till the thirteenth century, when the iſland was taken by Alexander, king of Scotland. At this period, however, they appear to have exerciſed the right of enquiring into the exiſting laws and petitioning for new ones, but they poſſeſſed no power of enactment. After the acceſſion of the Stanley family the liberties of the people began to extend, and, in 1430, they obtained the excluſive privilege of electing the members of this aſſembly, who were increaſed to twenty-four in number for the Iſle of Man alone. This dawn of liberty, however, was only of ſhort duration, being deſtroyed by the Houſe of Keys itſelf, which, upon the death of any of its members, proceeded to elect another in his ſtead, in direct oppoſition to the democratic principle upon which the inſtitution was founded. Conſtituted notwithſtanding as it was, this aſſembly proved no inconſiderable check upon the encroachments of the regal authority. In conjunction with the king, his council, and the deemſters, it poſſeſſed the entire legiſlative authority of the iſle. Theſe four eſtates were denominated the *Tynwald Court.* Since the purchaſe of the regalities by the Britiſh government, the power of this court has been conſiderably reſtricted, but it ſtill retains the right of making certain ordinances, provided they agree with the general tenor of the ancient cuſtoms, which form what may be termed the Manks common law. The power of the Keys is judicial as well as legiſlative. Appeals may be made to them from the inferior courts, and in all ſuch caſes, as well as in actions, their deciſion is final, unleſs the cauſe be carried before the king in council. They always determine by a majority, and in their legiſlative capacity they conduct their deliberations in private. Foreigners, as well as natives, are eligible to ſeats in this houſe, the only requiſite qualification being the poſſeſſion of land. A grand court, conſiſting of the whole four eſtates of the iſland, continues to be held every year at the Twynald-Mount, where all new acts are publicly read, and thenceforth become binding on the people, who are ſuppoſed to give them their concurrence. The governor is nominated by the king. He is chancellor *ex officio*, and by himſelf or deputy is empowered to hear appeals from the deciſion of minor tribunals in all civil queſtions, except ſuch as relate to the poſſeſſion of land, which can only be entertained in the Keys. All arreſts, both civil and criminal, are granted in his name, and he can, at pleaſure, convene the different branches of the legiſlature; but there are ſome doubts reſpecting his powers of prorogation. He likewiſe poſſeſſes the prerogative of coining, as the repreſentative of the ancient monarchs: but no money is legal till declared to be ſo by an act of Tynwald.

The council of the governor conſiſts of five perſons, who hold their ſeats *ex officio*. Theſe are the lord biſhop, the water-bailiff, the attorney-general, the clerk of the rolls, and the archdeacon. Several other officers, both of the church and ſtate, have likewiſe claimed this privilege, but their claims have not yet been recognized. The deemſters, of whom there is one for the northern, and another for the ſouthern diſtrict of the iſland, are judges both in common and criminal cauſes. They have each a diſtinct court, anſwering to thoſe diviſions where they preſide, and give judgment without the intervention of a jury. The ſituation of deemſters is of great dignity, and their influence over the people formerly reſembled, in ſome degree, the civil authority of the ancient Druids, whoſe inſtitutions were, in all probability, the original foundations of their authority. In the criminal courts, the uſage obſerved by the Saxons before the conqueſt is ſtill retained. The biſhop, or his deputy, ſits with the governor till ſentence is to be pronounced, when, inſtead of the uſual enquiry of guilty, or not guilty, the deemſters aſk, "Vod ſir charree ſire?" ſignifying, "May the man of the chancel, or he that miniſters at the altar, continue to ſit." If the queſtion is anſwered in the affirmative, the biſhop, or his ſubſtitute, continues ſitting, but if ſentence of death is to be pronounced he riſes and leaves the court.

The other chief civil officers of the iſland, beſides thoſe already noticed, are the lieutenant-governor, who has little power, except in the abſence of the governor; the high-bailiffs, one in each of the four towns, the coroners or ſheriffs, the lock-men or bailiffs, coroner's officers, and the conſtables. The coroner is chief keeper of the peace, and is authorized to arreſt any one who breaks it. He likewiſe ſees that the governor's arreſts are put in execution, has the impannelling of the juries, and the charge of enforcing the ſentences of the courts of law.

Laws.—To give a detailed view of the laws of this iſland, would occupy a greater ſpace than can with propriety be permitted in an article like the preſent. The more prominent features and characteriſtic peculiarities by which they are ſo diſtinguiſhed ſeem, however, to have a more than ordinary claim to a diſtinct and ample expoſition. At an early period, the Manks conſtitution and government being wholly arbitrary, the will of the ſovereign, or of his judges, was probably the only principle which regulated the deciſions of their courts of juſtice. This much at leaſt is certain, that no laws of any deſcription were ever promulgated till towards the middle of the fifteenth century, when the independence of the Houſe of Keys was fully eſtabliſhed. Since that time, juſtice has been adminiſtered, generally, with ſtrict impartiality, either according to the ſtatutory enactments of the Tynwald, or the common law of the country. The laws affecting the lower orders were, ſo late as the year 1777, oppreſſive and tyrannical. They even regulated the amount of the wages of workmen, and ordained that all children not brought up, or put apprentice to any trade, ſhould be ordered into ſervice, except in the event of the parents being old or decrepid. Servants refuſing to work on the legal terms were impriſoned till they gave their compliance, and no perſon who had done a day's work for any compenſation, could leave the iſland before he or ſhe had arrived at the age of twenty-five years. On the ſubject of marriage, the laws were nearly ſilent till the year 1757, ſo that perſons of any age or condition might marry without either licence or the publication of banns. Since that time, however, the marriage regulations have been, in ſome reſpects, ſimilar to thoſe of England, but, in others, they are yet eſſentially different. The ceremony is according to the forms preſcribed by the Proteſtant church, but no perſon without a ſpecial licence from the ordinary can enter the ſtate of wedlock till he has received the ſacrament. By the Manks law, the huſband and wife are not ſo completely united into one perſon as they are by the Engliſh. Marriage is, indeed, regarded as a ſpecies of partnerſhip, but it does not give an excluſive title to eſtates, either real or perſonal. In fact, the landed property of each always remains diſtinct, but the parties poſſeſs every thing elſe in common, with this difference, that the huſband may bequeath his poſſeſſions to whom he pleaſes; but ſince the act paſſed in 1777, the wife can only leave her's to the children of the exiſting union. In caſe of either being found guilty of treaſon or felony, only the criminal's ſhare is liable to forfeiture. Fathers are obliged to maintain their children till they reach the age of fourteen, when all legal obligation between them ceaſes. A child may then claim any legacy, and depart, if he is ſo inclined; but if he remains, his father is entitled to the intereſt or uſe of his money as a compenſation for his maintenance. Upon the death of the huſband without a will, the widow enters upon her ſhare of the property only, but in the event of the woman's demiſe inteſtate, the huſband enters upon the whole. Where there is only one child, and the father neglects to appoint a guardian, his kindred are entitled to the cuſtody of it; but if there are two children, the mother takes care of the eldeſt, and the ſecond is taken care of, as an only one would be. A child, though a baſtard at the time of its birth, becomes legitimate by the marriage of the parents within three years after that period. At the deceaſe of his father the eldeſt ſon ſucceeds to his heritable property, and if there are no ſons, the eldeſt daughter, even though the eſtates are entailed. The origin of this cuſtom, ſo different from the practice in other feudal countries, is attributed to the bravery of the ſouthern women in aſſiſting their huſbands in a great battle, and enabling them to gain the victory.

All the lands of this iſland at an early period belonged to the lord or ſovereign: even ſo lately as the ſixteenth century, real property could not be alienated on any pretence without his ſpecial conſent, or that of his three principal officers. The occupants were ſtyled the lord's tenants, and were ſubject to the payment of a fine or rental. Attempts were made about the middle of the ſeventeenth century to render all the tenures leaſehold, either for three lives, or for twenty-one years. This produced a warm diſpute between the ſovereign and the land-holders, which was not terminated till the year 1703, when it was agreed that the latter ſhould retain their poſſeſſion ſo long as they continued to pay the fines and rentals ſettled between them and the earls of Derby's commiſſioners after the year 1643. The period of a leaſe is reſtricted to twenty-five years, and a mortgage, not redeemed within five years, renders the parties liable to the fine of alienation.

The whole iſland was formerly divided into ſix hundred portions, called quarter-lands, but Feltham ſays, their number is now increaſed to ſeven hundred and fifty. All other eſtates are either allotments out of, or encroachments upon, theſe. The titles to property are, as may be ſuppoſed, various and ſimilar in their nature, though ſometimes different in their limitations, to thoſe acknowledged by the laws of England. Unmoleſted poſſeſſion for ten years, till very lately, conſtituted a ſufficient right to any ſpecies of property; but the term is now extended to twenty-one years. Every proprietor poſſeſſes the privilege of feeding a certain number of cattle upon the commons, which abound in various parts of the iſle, and every inhabitant has the privilege of quarrying ſtone and digging peat for his own uſe. All wrecks not claimed within a year and a day, and all mines, belong to the lord by his prerogative. Game, likewiſe, was anciently his property. Goods taken in diſtreſs, or execution, muſt remain one month as a pawn, redeemable by the tenant, or defendant, on paying of the rent, or of money recovered in an action at law.

But the moſt marked peculiarity in the Manks law is, that no arreſt can be granted againſt a landed proprietor or native, to impriſon or hold him to bail in a civil action, unleſs there appears ſome juſt cauſe to conclude that he intends leaving the iſland without making ſatisfaction to his creditors. Such perſons as are proſecuted for a foreign debt can only be obliged to find bail for his perſonal appearance, and for the forthcoming of all his property on the iſland, except his clothes and money, which remain his own. It is from the operation of this latter law that the unfortunate, and too often the fraudulent alſo, find an aſylum here from the proſecution of their creditors. By converting the reſidue of the property into money, they are enabled to reſide on this iſland in comfort, and without the danger of legal moleſtation. If, however, there is any thing clearly ſhewn to be ſo criminal in the conduct of any individual as to infer the pains of law, the governor generally grants a warrant for delivering him over to the juſtice of the country to which he belongs.

By the laws relative to public wrongs, here no offender can be convicted of any capital crime, except by a jury at the court of general gaol delivery. Formerly, indeed, a perſon who made an attack upon the lord, or his lieutenant, could be condemned immediately, without any form of trial, but the practice has been long obſolete. This offence was deemed treaſon; ſo likewiſe was the ſtriking of any of the lord's ſervants in his preſence, robbing him in court, conſtraining him to hold a Tynwald court, relieving or concealing a rebel, counterfeiting the current coin of the iſland, and bringing in any falſe money and making payment with it. Thus, even copper coinage is treaſon, contrary to the law of England, which confines it to the counterfeiting of gold and ſilver money.

For bigamy, or polygamy, there is no puniſhment by the Manks law, even at the preſent day; but the ſecond marriage, being illegal, is null and void, and the children are, conſequently, regarded as baſtards, and deprived of their rights to inherit the property of their parents. Suicide is puniſhed by forfeiture. In the event of a rape on a married woman, there is no alternative but death; but if the woman is unmarried, ſhe has her choice to hang, behead, or marry the offender. What is remarkable, there is no inſtance of a conviction for this crime upon record, and only one traditionary, and in that caſe the lady is ſaid to have adopted the laſt condition, juſt at the moment when her raviſher was about to be launched into eternity. Aſſault and battery are puniſhed by fine and impriſonment, according to the deciſion of the governor or deemſter, without the intervention of a jury. It is felonious to enter a houſe with burglarious intention, even though it ſhould be without a door, provided two ſticks are placed acroſs the entrance. Forging is not accounted criminal, at leaſt the offence is only regarded by the law as a civil debt. Theft, above the value of ſixpence-halfpenny, is capital. Below that value the crime is termed petty larceny, and ſubjects the offender to corporal puniſhment and impriſonment at the diſcretion of the court. To convict for felony one reſpectable witneſs is now ſufficient, if his evidence is ſupported by probable circumſtances.

Religion.—The eſtabliſhed religion of Man is the ſame with that of England. Toleration, however, having extended its beneficial influence here, as in other parts of the Britiſh empire, Diſſenters of almoſt every denomination are prevalent. Among theſe the moſt numerous ſect is undoubtedly the

the Methodifts, who form at leaft one-tenth of the whole population. The eftablifhment is placed under the direction of a bifhop, affifted by an archdeacon, two vicars-general, and an epifcopal regiftrar. The patronage of the fee ftill continues in the Athol family, but the nomination of the fuperior clergy muft be approved of by his majefty. The bifhop is confecrated by the archbifhop of York as metropolitan of the diocefe, and enjoys all the privileges and fpiritual rights of other bifhops; but his fee not being baronial, he is not entitled to vote in the houfe of lords. He has, however, a feat, as Mr. Wood fuppofes, by courtefy, above the bar. The firft bifhop of Man was St. Germain, to whom the cathedral church is dedicated. At that time the diocefe was limited to the boundaries of the ifland, nor did it extend beyond them till the conqueft of the weftern ifles by the Norwegians, about the commencement of the twelfth century. When the *infulæ Sodorenfes*, fo called from the bifhopric of Sodor, a fmall village in Iona, and once "the metropolis of learning and piety," were united to it; the whole formed one bifhopric, ftyled Sodor and Man. The metropolitan at that period was the archbifhop of Drontheim. After the annexation of the ifland to the crown of England, the conjoined bifhoprics were feparated.

Surface and Rivers.—The general afpect of this ifland prefents confiderable diverfity of hill and dale. A chain of mountains, moderately high, divides it nearly into two equal portions, in a direction from N.E. to S.W. This range is broken only at one place, between mount Kreevey and South Barrule. The moft confpicuous fummit of the whole is Snawfel, the height of which, as taken by the barometer, appeared to be 580 yards above the level of the fea. The two Barrules, which form its northern and fouthern extremities, are nearly of the fame elevation. Between North Barrule and mount Kreevey arife feveral rivers, which empty themfelves into the fea at Ramfey, at Laxey, and at Douglas. Of thefe rivers, that of Ramfey is by far the largeft, being fo much influenced by the tide, from the level nature of the diftrict through which it flows, that it is navigable for veffels of confiderable burthen at the diftance of more than two miles from its mouth. The other rivers in the ifland are very fhallow and inconfiderable ftreams. Here is a great deficiency of wood.

Soil and Climate.—The foil of this ifland is various. Towards the fouth parts the greater proportion is loam, but ftiff clays likewife abound, and in fome fpots the furface exhibits a fine light fand. The northern diftrict confifts principally of a fandy loam, with a bottom of clay or marle. Here is an immenfe tract of land called the *Curraugh*, extending nearly acrofs the whole ifland, from Ballaugh to Ramfey, which was formerly a bog, but is now drained and produces excellent grafs crops. In a few places of this tract is a remarkable layer of peat, which ftretches itfelf feveral miles under a ftratum of gravel, or earth. The thicknefs of the layer varies from two to three feet, and that of the gravel, &c. from two to four feet. In other parts of the fame tract the peat has been removed to the depth of ten feet. The climate is generally reckoned milder in winter than that either of England or Ireland in the fame latitude, as, from the proximity of every part of the ifle to the fea, froft and fnow are feldom of long continuance. The fummers, however, are lefs warm, and gales of wind and falls of rain, during this period, are extremely frequent, often occafioning very confiderable damage, not only to the fruit, but alfo to the grain-crops.

The mineralogy of the Ifle of Man offers very few objects of intereft or importance. More than two-thirds of the whole furface refts on ftrata of wacke-flate, or clay-flate. The hills, called North and South Barrule, are compofed of mica-flate, covered with clay-flate; Mount Kreevey confifts of the fame materials, traverfed by many large veins of quartz, two or three feet in thicknefs. On the north fide of South Barrule appear fome blocks of granite, containing a quantity of filvery mica, reddifh feldfpar, and grey quartz. In the neighbourhood of Caftletown is found a blueifh-grey lime-ftone, intermixed with impreffions of fhells and other marine exuviæ, and interfected by fmall veins of calcareous fpar. This lime-ftone lies above a ftratum of wacke flate, from which it is feparated at fome points by a thin layer of white clay, which does not in the flighteft degree effervefce with acids. Near Pool-vafh-bay this mineral becomes fo highly indurated, that it is quarried below high-water mark, as a tolerable good marble for tomb-ftones. Not far from Langefs a fmall quantity of compact brown iron-ftone is found, lying under a breccia compofed of pieces of quartz in a filiceous bafe, and bearing fome refemblance to horn porphyry. The Calf of Man, which is feparated about 100 yards from the main, confifts entirely of a gloffy blueifh-grey clay-flate, lying more inclined to the eaft, and more unequally ftratified than the flate-rock on the oppofite fhore. At Kirk Arbovy are fhafts of lead-mines now entirely deferted. Breda-head copper-mine is chiefly the fulphuret of that metal. The mines of Foxdale, celebrated for their fine lead-glance, are now entirely drowned by the tide; fo that the only mines at prefent wrought on the ifland are thofe of Laxey, which produce a very confiderable quantity of lead and copper, both of excellent quality. Cryftals of iron pyrites are occafionally found in different places.

From thefe few facts the geologift will perceive that this ifland confifts partly of primitive clay-flate and mica-flate, refting probably upon granite; of grey wacke-flate, and of lime-ftone which feems to belong to the rocks of tranfition of the Wernerian geognofy; of fand-ftone of the earlieft formation, and of fand refting upon clay.

The agriculture of this ifland, though much improved of late years, ftill continues at a very low ebb. More than a third of the whole furface lies in an uncultivated ftate, and entirely appropriated to the feeding either of fheep or cattle. The value of land in this condition varies from five to ten fhillings *per* acre; but arable land often rifes above two pounds. The enclofures are formed in general of embankments of earth, unaccountably crooked and irregular, and containing from four to ten acres. Barley conftitutes the chief grain raifed by the farmers, as the foil and climate are thought to agree better with its growth than with that of any other corn. Potatoes and turnips are likewife cultivated in great abundance. Crops of flax are very common in every part of the ifland; almoft every cottager growing a fmall quantity, both for home ufe and exportation. Hemp is fown in gardens, and on rich enclofures, but very rarely in the open fields. The plough in common ufe is of a light conftruction, and generally procured either from England or Scotland. Owing to the fmall fize of the horfes, four are requifite to turn a furrow four inches deep. The Manks harrow and roller are generally of a good make, though light; but with refpect to wheel-carriages, a total ignorance of their proper conftruction prevails. Cart-wheels are invariably very narrow and fmall. Drilling and hoeing machines are little ufed.

The native fheep of the ifland are fmall and hardy, bearing a refemblance to the South Down: when properly fed, their meat is of the moft delicious kind. This is ftill called the mountain breed, being reared entirely on the hills and uplands; but in the lowlands a larger fpecies has been introduced.

troduced. Besides these there is a third breed, called the Laughton, which affords very fine wool of a dark buff colour, much used by the inhabitants in making stockings. Many hundred head of cattle are fattened annually for exportation; and pigs and poultry are reared in great abundance, as are also geese and ducks; but turkies are rather scarce. The manure chiefly used by the farmers is farm-yard dung, or, if near the shore, sea-weed. A regular rotation of crops is little understood or practised, and summer fallowing scarcely ever occurs. The indolent disposition of the men, (for the women are lively and active,) joined to the attractions of the herring fisheries, and the operation of the tithe system, are radical obstacles here to agricultural improvement, which even the Cumberland Society, lately extended to this island, will find it difficult to remove. Intimately connected with this subject is the state of the

Roads and buildings, both of which have of late been greatly improved. Forty years ago, the former were dangerous for carriages even in summer, but at present they are very good during that period; though, owing to the clayey nature of their composition, they sometimes become impassable for several days in winter. Houses of the best sort, both in town and country, are constructed of hewn stone; and those of an inferior description of rough stone. Farm-houses and offices are usually small, irregular, and ill built: a few modern ones, however, are on a better plan. The meaner cottages consist principally of sods of earth, with a thatch of straw. The bridges are mostly in tolerable condition, being built and supported at the expence of the public, and requiring an act of Tynwald to authorise their erection.

Towns and Villages.—This island possesses a number of small towns and villages, situated principally on the coasts. The chief of these are Castleton, Douglas, Peel, and Ramsey. Castleton is considered as the capital, being the residence of the governor, and the seat of the superior courts; but Douglas is of more importance in a commercial point of view. In the centre of Castleton is Castle-Rushen, an irregular fortified building of stone, said to have been erected in the year 960, by the Danish prince Guthred, who was buried within its walls. The stone glacis, which surrounds it, is supposed to have been the work of cardinal Wolsey. This fabric was the ancient mansion of the kings of Man, where they lived in all the warlike pomp of feodal magnificence. Douglas, only a century ago, was merely a group of huts; but it is now the most opulent and best built town on the island. The duke of Athol's principal residence is situated in this vicinity. Ramsey is a neat town, where the deemster of the northern district resides, and holds his courts. Peel is likewise a pleasant village, and more distinguished, than any other spot in Man, for its remains of antiquity. Peel castle, placed on a small island, divided from the main by a narrow channel, deep during the flow of the tide, but easily fordable at its ebb, is a very noble remnant of ancient architecture. Near it are the ruins of two churches: one dedicated to St Patrick, of uncertain origin; and the other called St. Germain's, or the cathedral, which was constructed about the year 1245.

Commerce and Manufactures.—None of the mechanical arts having yet reached any degree of perfection in Man, its manufactures are few, and of little value. Indeed, the only ones worthy of observation are those of Douglas, where sheeting, towelling, sail-cloth, and sack-cloth are made. In commercial concerns, however, it is of more importance, great quantities of lead, cattle, sheep, fowls, butter, and eggs, being shipped from hence to England. Some strong linens and sail-cloth likewise form articles of export, but the chief source of opulence here, as in Shetland, is the herring fisheries; for the smuggling traffic, which proved so advantageous in former times, is now almost entirely cut up. About five hundred boats are regularly employed in the fisheries every season, beginning with July, and ending with September. A few years ago it was customary for the fishermen to offer up a prayer for success on leaving the harbour, but that practice has fallen into disuse. As yet, however, they make it a rule never to sail either on a Saturday or Sunday evening, lest the sabbath should be violated. The ordinary size of the boats is about eight tons, and their value, including the nets, &c. somewhat more than 80*l.* Every night's produce is divided into nine shares, of which two belong to the proprietors of the vessels, one to the owners of the nets, and the residue to the fishermen. Of the white herrings, the greater proportion are sold in England, but most of those termed red herrings are exported to the different ports of the Mediterranean. Previous to the commencement of the late war, a salmon-fishery was established here upon an extensive scale, but since that period it has much declined. The imports to the island consist of manufactured goods of almost every description, together with coal, wine, brandy, and other spirituous liquors: the balance of trade is greatly against the island. The deficiency, however, may probably be made up by remittances to the numerous strangers, who, in order to avoid the visits of a bailiff, or the extravagance of English living, resort hither either as a temporary or permanent retreat.

Antiquities.—The Isle of Man contains considerable vestiges of ancient times. The little Isle of St. Michael is joined to the Main, at Longness-point, by a high breast-work, about one hundred yards in length, and on the Isle itself are the ruins of a circular fort, built by one of the earls of Derby. On the road from Castle-town to Douglas, at the distance of two miles from the former, stand the venerable remains of Rushen-abbey, founded in the year 1098 by prince Macmarus. This establishment consisted of an abbot and twelve monks of the Cistercian order, who were so celebrated for their hospitality, as to acquire the title of almoners of the poor. The abbot, in later times, became a baron of the island, and was invested with the power of holding courts in his own name. Many of the kings of Man were interred in this monastery. Not far from Douglas appear the remains of another monastery for female votaries, said to owe its original foundation to St. Bridget, in the sixth century. The prioress of this institution was likewise a baroness of Man, and held courts in her own name. Immediately adjoining to Laxey, on an elevated scite by the road-side, is a small circular range of stones, some of them standing erect, and others leaning towards the centre, which has apparently formed a *kist-vaen*, but is now mutilated. This monument bears the name of the *Cloven-stones*. The parish of Kirk-Andreas, north of Ramsey, is particularly distinguished by a variety of ancient remains. The entrenchment at Ballachury, situated on a small natural eminence, is in more complete preservation than, perhaps, any other erection of the same kind in the British dominions. It is of a square form, and has a very noble bastion at each angle; the whole surrounded by a wet foss of ample dimensions. Many barrows are to be met with in this neighbourhood, some of which have been opened, and earthen urns discovered in them. In the parish church stands a square stone pillar, with a Runic inscription, thus translated by Mr. Beaufort. "The son of Ulf of the Swedri (or Swedes) erected this cross to the warrior Afterarin, the son of Cunnu." Many other Runic inscriptions and tumuli appear in various parts of the island; indeed, they are probably more numerous here than in any other diftrict of a fimilar extent in Europe. The Tynwald is the only object that now remains to be mentioned. It is fituated about three miles from Peel, near the fide of the high-road leading to Douglas. The name of this artificial mount is compounded of the Britifh words Tyng and Val, fignifying the juridical hill. This monument of ancient days is in the form of an obtruncated cone, divided into three ftages or circles, regularly advanced three feet above each other, but proportionally diminifhed, both in circuit and width, the nearer they approach the fummit. The whole was formerly furrounded by a ditch and rampart of earth, inclofing a fpace, on which ftood a fmall chapel dedicated to St. John, lately re-built. Concerning the firft erection of this mount nothing is known, either from hiftory or tradition; but judging from its name and appropriation, it would feem to have been conftructed by the aboriginal inhabitants of the ifland.

Population, and Means of Defence.—The number of inhabitants in this ifland has varied much at different periods. In the time of Bede, it is faid by that author to have contained only 300 families. Hollinfhed, who wrote about the year 1584, obferves, "there were formerly in this ifland 1300 families, but now fcarcely half that number." In 1726, the population was 14,511; in 1757, it had increafed to 19,144; and, in 1792, to 27,913. At prefent it is thought to exceed 30,000 perfons, an increafe partly owing to the improved ftate of agriculture, and partly to the greater number of ftrangers who now take up their abode in this land of freedom from taxes and arrefts. The military eftablifhment of the ifland confifts folely of a regiment of fencibles, who are enlifted voluntarily, and receive a bounty of three guineas. Their pay is the fame as that of Englifh regiments, and the fervice being eafy, moft of the individuals which compofe them are engaged in fome trade or bufinefs, for here military duty is not reckoned incompatible with the purfuits of civil life.

Language, Manners, and Cuftoms.—From the number of ftrangers continually flocking to this ifland from Great Britain and Ireland, and the commercial intercourfe that fubfifts between them, it may reafonably be fuppofed that the Englifh language is ufually fpoken in the towns on the fea-coaft. In the interior, however, the original Manks language ftill prevails. This laft is merely a dialect of the Gaelic, or that ufed in the Highlands of Scotland, with a commixture of Welfh, Saxon, and Danifh words. The radixes, indeed, are chiefly Welfh. The New Teftament, and feveral fcriptural publications, have been tranflated into the Manks tongue; and in the country parifhes it is cuftomary to preach in this language and in Englifh every alternate Sunday.

With refpect to the character of the people in this ifland, it is generally obferved that the men are habitually of a lazy and indolent difpofition. This is not improbably the confequence of the herring-fifheries, in which the greater part of them are engaged; for fuch purfuits, in certain conditions of fociety, are, beyond doubt, prejudicial to the more active concerns of agriculture and the arts. In fine, wherever fifheries are eftablifhed upon a fcale fufficiently extenfive to afford employment to the men, the affairs of the field are left to the women in a great meafure; and this is precifely the cafe in Man, the females being both the reapers and threfhers of all the corn in the ifland. Hence it happens, that the women are as remarkable for their activity and fprightlinefs, as the men are for their indolence. Unfortunately, however, an extreme laxity of opinion prevails among them in refpect to chaftity. A fervant girl, by becoming a mother, does not fuffer any degradation of character. The event is, therefore, of no unfrequent occurrence, and is probably the reafon why women of the town are fcarcely ever to be met with, even in Douglas. Like the Highlanders and Swifs, the Manks are much attached to their native vales and mountains, as well as to their ancient cuftoms and laws. They conceive themfelves to be independent of Great Britain, and were much affected by the fale of the ifland, becaufe they feared it would blend the countries. A great fondnefs for litigation, and an uncommon love of hofpitality, are ftriking, though fomewhat contradictory, features, in the Manks character. So much, indeed, are they naturally difpofed to charity, that poor's rates are wholly unknown, and there is no fuch inftitution as an hofpital, or workhoufe, in the whole ifland. Every parifh, however, has a charity-fchool, and generally a fmall library, both of them fupported by voluntary contributions, or funds arifing from legacies or donations. Neither fhoes nor ftockings are worn by the lower orders, excepting on particular occafions. A blue cloak is the common body-drefs of the women, and ftrangers are ufually habited in a failor's jacket, and trowfers of the fame colour. This drefs is termed the Manks livery. The belief of fairies, and fuch imaginary fpirits, ftill firmly maintains its influence over the inhabitants of this ifland; a circumftance afcribed by many to the natural gloom and folitude which pervades every portion of the country. Thefe airy fpirits are divided, by fuch as pretend to fkill in vifionary lore, into two claffes, the one comprehending the playful and benignant fprites, and the other the fullen and vindictive ones. The former, gay and beautiful, feek the margin of the brooks to fport among the bufhes, or dance on the tops of the adjacent mountains, while the latter find a habitation in the hideous precipices of the fea-fhore, and to their malignant influence the Manksman imputes every calamity which may affail him. A belief in the fecond fight, and in warnings and fore-knowledge of their own deaths, is no lefs common than this fairy fuperftition. Many, in their lonely wanderings, have met with a vifionary funeral, following them wherever they might turn, awfully portentous of the approaching diffolution of the devoted victim. Thefe opinions are not confined to the lower orders alone, but are credited by individuals even of high refpectability. In other refpects, however, the fuperior claffes differ completely from their fellow iflanders, and affimilate themfelves as much as poffible, both in drefs, habits, and fentiments, to the fame orders in England. An Account of the paft and prefent State of the Ifle of Man, by George Woods, 8vo. 1811. A Tour though the Ifland of Man in 1797 and 1798, by John Feltham, 8vo. 1798. A Journal kept in the Ifland of Man by Richard Townley, efq. 2 vols. 8vo. 1791.

Man is alfo an ifland in the Pacific ocean, in St. George's channel, between New Britain and New Ireland, about 50 miles in circumference; difcovered by captain Carteret in the year 1767. S. lat. 4°. E. long. 151° 25'.—Alfo, a town of Hindooftan, in the Carnatic; 11 miles W. of Tricolore.

Man *at Arms*, in *Ancient Military Language*, derived the appellation from being completely armed de cap-à-pied, or from head to foot. The men at arms formed a part of the cavalry of our ancient Englifh armies foon after the conqueft, which confifted of knights, or men at arms and hobilers; as the infantry was compofed of fpear and bill men, crofs-bow men, and archers. However, in garrifons the men at arms occafionally ferved on foot. Thefe men at arms were chiefly compofed of the tenants in capite, holding by military fervice, or their fubftitutes, fometimes called fervientes. The defenfive armour of a man at arms was a hauberk of double mail, compofed of ringlets of iron linked together

together like a net, which covered the body, and to it were joined a hood, breeches, ſtockings, and ſabatons or ſhoes of the ſame conſtruction: the hands and arms were alſo defended by gauntlets and ſleeves of mail; the hauberk was the proper armour of a knight; an eſquire might wear a ſhirt of mail over his gambeſon, but might not uſe the hood, breeches, hoſe, nor ſleeves of mail. Sometimes, but not commonly, men at arms wore habergeons made of plate mail, formed of ſmall round plates of iron, laid one over the other like ſcales of fiſh. Sometimes over the hauberk, but commonly under it, was worn a looſe garment called the *gambeſon* (which ſee), deſcending to the knees, ſtuffed with wool or cotton, and deſigned for deadening the ſtrokes of the ſword or lance, which, though they might not divide the mail, would ſeverely bruiſe the body without the interpoſition of the gambeſon. Under or between the hauberk and gambeſon, a breaſt-plate of forged iron, called a plaſtron, was occaſionally put on; over which all men of family wore ſurcoats of ſatin, velvet, or cloth of gold or ſilver, richly embroidered with their armorial bearings. By a ſtrap hung over the neck, the men at arms carried a ſhield made of wood, covered with leather, bound or ſtrengthened with iron or braſs, having handles on the inſide for *braſing* it, which was the term then in uſe for putting it over the left arm, Fr. *bras*. Theſe ſhields were for at leaſt a century after the conqueſt of a triangular form, pointed at the bottom, and a little convex in the direction of their breadth. The helmets worn by the men at arms were of different forms; ſome conical or pyramidical, with a ſmall projection, called a "naſal," to defend the face from a tranſverſe ſtroke; ſome cylindrical, covering the whole head down below the chin, with apertures for ſight and breath; and others in which the face was totally uncovered. Helmets with bevers and vizors do not ſeem to have been in uſe till the middle of the fourteenth century, about which time the hauberk was exchanged by many of our men at arms for plate-armour, ſo called from being formed of plates of iron. On the creſts of their helmets' kings frequently wore their crowns, earls and dukes their coronets, generals or other officers of rank either their armorial cogniſances, or any other device at pleaſure. This was done to give them a more terrific aſpect to their enemies, and to render them conſpicuous to their own officers and ſoldiers. To the above liſt of defenſive armour we may add the war-ſaddle, whoſe arcon of bows of ſteel covered the rider as high as the navel. The knights of the three or four reigns next ſucceeding the conqueſt, commonly wore the pryck ſpur, which had only a ſingle point, after which the rouelle, or wheel ſpur, came in faſhion, ſome of which rouelles were ſix inches in diameter. Thus enveloped and loaded with incumbrances, we need not wonder, that in the heat of ſummer, and duſt, and preſſure of an engagement, men at arms ſhould be ſuffocated in their armour.

The offenſive arms of a horſeman, or man at arms, were a ſword or ſwords, a lance, and a ſmall dagger, called a "Miſericorde" (which ſee), and alſo iron maces ſuſpended at their ſaddle-bow. The horſes of the men at arms were no leſs encumbered than their riders; their faces, heads, and ears, were covered over with a ſort of maſk, ſo contrived that they could not ſee right before them and be terrified. This maſk was called a "chafron," or ſhafront. Beſides other appendages, which it is needleſs to enumerate in detail, they were occaſionally covered all over with mail, or linen ſtuffed and quilted like the gambeſon, and adorned with rich embroidery. Horſes, thus covered, were called "barded," and corruptly barbed horſes. Theſe war-horſes, for preventing their being fatigued, were not mounted till the men at arms were certain of coming to action, and they had commonly hackneys for riding on a march. Barded horſes were in uſe in our armies at the time of king Edward VI. When plate-armour came into general uſe, about the middle of the fourteenth century, the accoutrements of the men at arms were a cloſe helmet, with a viſor, or viſor and beaver revolving on the ſame pivot, and capable of being lifted up or let down. The neck and throat were defended by a gorget, or hallercet, the body by a cuiraſs, the arms by braſſarts, the hands by gauntlets, the ſhoulders by poultrons, the thighs by cuiſſarts, and the legs by iron boots, called greaves, and ſometimes by boots of jacked leather. Under all theſe was worn a jacket of thick fuſtian, or buff leather. About the time of queen Mary the appellation of men at arms, ſignifying the heavy-armed cavalry, ſeems to have been changed to that of ſpears and lances, and afterwards to cuiraſſiers. The armour of a lancier was much the ſame as that we have deſcribed: their offenſive weapons were a *lance* (which ſee), of ſixteen or eighteen feet in length, a ſword, and petrenels, which laſt were ſomewhat longer than the piſtols then in uſe.

The hobilers (ſee Hobler) were a ſpecies of light horſemen, chiefly calculated for the purpoſes of reconnoitring, carrying intelligence, haraſſing troops on a march, intercepting convoys, and purſuing a routed army: their horſes were ſmall and unable to reſiſt the ſhock of a charge. Some derive the appellation from a Daniſh word, ſignifying a mare; but this is not likely, as the men at arms were chiefly mounted on ſtone-horſes, and in the days of chivalry it was conſidered a degradation for any knight or man at arms to be ſeen mounted on a mare. This name was more probably derived from the hobbies or ſmall horſes which they rode. The eſtabliſhment of hobilers has been commonly, but erroneouſly, referred to the reign of Edward III.; but they are mentioned as part of the Britiſh army that attended king Edward II. into Scotland, in the year 1322. The name ſeems to have been totally loſt about the latter end of the reign of Henry VIII. or queen Mary; theſe troops being then diſtinguiſhed by the appellation of demy-launces and light horſe. The arms and appointments of a hobiler, as directed by king Edward III., were a horſe, a hagueton or armour of plate, a bacinet, iron gauntlets, a ſword, knife and a lance. Sometimes archers were mounted on light horſes, whence they were ſtyled hobiler-archers. Groſe's Mil. Antiq. vol. i.

Man, in the *Materia Medica of the Ancients*, a name by which manna has been called by the oldeſt writers. There has been, however, ſome confuſion in the hiſtory of manna, owing to the too general uſe of this word, the ſame authors uſing it as the name of ſeveral other ſubſtances of very different kinds, which came to their hand in forms of ſmall granules, or flakes like the manna. The fragments of frankincenſe, in particular, were called by this name, with the addition of the word *thuris*, and ſometimes without man or men ſtanding ſingly for that drug.

Man, in *Mythology*, the name of a deity among the ancient Germans; whom they ſuppoſed to be the ſon of Tuiſton, and celebrated with ſongs, as the founder of their nation: and to him they conſecrated their groves and foreſts.

Man *the Capſtan*, on board a *Ship*. See Capstan.

Man *the Side*, or *Ladder*, is when an officer or any perſon of diſtinction is at the ſhip's ſide ready to come aboard, the men are commanded to wait, and help him up the ſide.

Man *the Top*, or *Yard*, a word of command for the men to go up to the top, or yard, for ſome particular ſervice.

Man *of War*, the ſame with a ſhip of war. See Ship and Rate.

MAN *of War Key* in *Geography*, a ſmall iſland among the Bahamas. N. lat. 26° 20'. W. long. 77° 15'.

MAN *of War Keys*, ſmall iſlands and rocks in the Spaniſh main, near the Moſquito ſhore. N. lat. 12° 55'. W. long. 88° 35'.— Alſo, ſmall iſlands at the entrance of Weſt harbour on the S. coaſt of the iſland of Jamaica.

MANA, a town of Peru, in the dioceſe of La Plata; 15 miles S. of Potoſi.

MANAA, in the *Jewiſh Cuſtoms*, a kind of offerings made in the temple, otherwiſe called Mincha. The word manaa is uſed in the Septuagint.

MANAAR, or MANARA, in *Geography*, a ſmall iſland, the name of which is derived from the Malabar words *man*, ſend, and *aar*, river, lying off the coaſt of Ceylon, about 60 miles S.W. of Jafnapatam. Manaar was formerly more flouriſhing than it is at preſent. The fort was ſmall, but ſtrong, ſquare, and regular. The city now conſiſts of only a few tiled houſes, government offices, and ſome low huts, inhabited by boatmen and fiſhermen. At low water the iſland of Manaar is ſeparated from Ceylon by a ſmall winding river; but when the tide flows, this river appears as an arm of the ſea, and is about three miles over. It is called the "gulf of Manaar." Manaar lies in N. lat. 9°, and is about 2½ German leagues in length, and one in breadth, including a ſalt river. The fort is ſituated near the channel or ſtrait which divides Manaar from Ceylon. There are beſides ſeven villages in the iſland. At the extreme end, where boat is taken for the coaſt of Coromandel, there are four or five churches for the natives and Malabar Chriſtians, beſides that of Carcal uſed by the Dutch. The iſland is barren and ſandy, with a few palmiras and cocoa-trees ſcattered here and there. The ſurrounding ſea ſupplies abundance of fiſh. The paſſage from this iſland to Ramiſeram, on the Coromandel coaſt, is not above 12 or 14 leagues, but the paſſage is interrupted by innumerable ſhallows and ſand-banks, many of which are high and completely dry, except during the monſoons. Adam's bridge, or Ramas bridge, is formed by a line of ſand-banks, which runs quite acroſs from Manaar to Ramiſeram. (See ADAM'S *Bridge*.) It is an univerſal opinion among the natives, that Ceylon was either the Paradiſe, in which the anceſtor of the human race reſided, or the ſpot on which he firſt touched on being expelled from the celeſtial paradiſe. Adam's bridge was, as they conceive, the way by which he paſſed over to the continent; and ſome of them imagine, that the gulf of Manaar, like the Red ſea in ſcripture hiſtory, cloſed after him to prevent his return. It is, however, univerſally believed, that Ceylon, at a diſtant period, formed a part of the continent, and was ſeparated from it by ſome great convulſion of nature. In addition to other circumſtances that favour this preſumption, we may obſerve, that the appearance of the ſoil and the ſurface of the country are very ſimilar on the W. coaſt of Ceylon and the oppoſite continent. The ſituation and appearance of the Maldive iſlands, on the other ſide of the peninſula of India, agree with thoſe on the W. coaſt of Ceylon, to ſupport the opinion that this continent muſt have been once much more extenſive, till the ocean, from ſome unknown cauſe or other, exceeded its former boundaries.

The gulf of Manaar, though too ſhallow to admit veſſels of large ſize, is not altogether uſeleſs for the purpoſes of commerce. Sloops, donies, and various ſmall veſſels, convey goods by this paſſage from Madras and other places on the Coromandel coaſt directly to Columbo, inſtead of rounding the iſlands by Trincomalee and Point de Galle. Notwithſtanding the obſtructions that occur in this paſſage, the Dutch have found means to carry on a conſtant traffic in this way between the weſtern coaſt of Ceylon and their factories of Tutucoran, Vipar, Manapar, Ponicail, and Kilkerre. Coarſe cloths and calicoes were the chief articles thus imported by the Dutch, and in return they carried back areca and cocoa-nuts, betel leaf, fruits, arrack, and coya, or cordage made from the cocoa-tree. All theſe places are now in poſſeſſion of the Engliſh, who may avail themſelves by the traffic which they afford.

The ſhort paſſage from Ramiſeram to Manaar forms a ſpeedy communication of intelligence to people of buſineſs; and government has boats ſtationed here for the purpoſe of conveying the "tapal," or letter-bags, between Ceylon and the continent. The "Peons," a caſt of people employed for this purpoſe, travel at the rate of five miles an hour, and they are relieved at certain ſtages by freſh runners. They uſually go from Columbo to Manaar, a diſtance of 160 miles, in three days. Here they take boat, and croſs over by Adam's bridge to Ramiſeram, and then proceed along the Coromandel coaſt to Madras. An expreſs will generally run from Columbo to Madras in eight days. See RAMISERAM.

The Dutch built a fort on the iſland of Manaar, with a view to command the paſſage and the communication with the continent by Adam's bridge. It was principally intended to prevent the ſubjects of the king of Candy from ſmuggling over any of the produce of the iſland, particularly ſpiceries; and alſo to cut off all intercourſe between that prince and thoſe of the continent, by which he might have formed alliances dangerous to their intereſts. The protection of the pearl-banks and pearl-fiſhery, which lie at no great diſtance from this iſland, was alſo another object for conſtructing a fort here. It alſo contributed conſiderably to the revenues of government, as a ſtation where certain duties are levied on the vaſt quantities of calicoes, coarſe muſlins, cottons, and other articles, brought through this paſſage to Columbo by the Moors, Malabars, and other inhabitants of the continent. Theſe circumſtances are ſufficiently important in order to keep in this place a conſtant garriſon, the expence of which is greatly overbalanced by its advantages. The garriſon ſtationed here conſiſts only of a company of Malays or Sepoys, under the command of an European officer; but during the pearl-fiſhery, an additional force is ſent from Columbo.

In proceeding along the coaſt of Ceylon from Manaar, the country is found to be ſandy, wild, and barren, equally deſtitute of accommodation and proviſions. The woods are ſo infeſted with wild animals, that it is very dangerous to travel along the roads here without a proper guard. The ſea is ſkirted by a tract of low flat ſand: but farther inland there are rice and paddy fields, with ſome ſcattered houſes. This appearance continues about 30 miles to the ſouthward of Manaar, when the wood and jungle again begin to approach to the ſhore, and to cover the whole ſurface of the country, till at Chilou the cinnamon woods ſhew the commencement of the diſtrict of Nigumbo. At Mantotte, near Manaar, there are ſome remains of antiquity. A Gentoo city is ſaid to have ſtood there, and to have been built by that harmleſs people, who took refuge here: the veſtiges of the embankment of a tank, and a number of brick ruins ſtill remain. About 12 miles from Manaar lies the village of Arippo, where the civil and military officers, who attend the pearl-fiſhery, reſide during the ſeaſon. This is the only place in their vicinity where good water can be procured. Here is a chapel for thoſe of the Roman Catholic perſuaſion, who conſiſt chiefly of the Parawas and Malabars, reſorting hither during the ſeaſon of the pearl-fiſhery. In the neighbourhood the woods are very full of deer and wild hogs.

hogs. At no great diſtance lies the bay of *Condatchy;* which fee. Percival's Ceylon.

MANABACCA, a ſmall iſland in the Eaſt Indian ſea. S. lat. 3° 59′. E. long. 131° 45′.

MANABEA, in *Botany*, (from the Caribean name of one of the ſpecies, *Manabo,*) Aubl. Guian. 61. t. 23—25, Juſſ. 107, Lamarck Illuſtr. t. 70, is referred by Schreber to *Ægiphila;* ſee that article. Willdenow in his Sp. Pl. v. 1. 615, defines eight ſpecies of *Ægiphila*, three of which are the above plants of Aublet; one is *Æ. martinicenſis* of Jacquin and Linnæus; another the *Nuxia* of Commerſon, Lamarck Illuſtr. t. 71; the three remaining ones being adopted from Swartz.

MANACA, a Braſilian bacciferous ſhrub, with an umbilicated fruit, like that of the juniper, containing three elliptical ſeeds, of the ſize of lentils; the part uſed in medicine is the root, which is great, ſolid, and whitiſh; its medullary ſubſtance, reduced to powder, has very conſiderable effects; but becauſe it works too violently, both upwards and downwards, in the ſame manner as ſcammony, or the eſula, it is uſually given only to very robuſt perſons, and then with correctives, in a juſt doſe; it has ſomewhat of a bitterneſs and acor. The root, macerated in water, makes a fomentation, or bath, for thoſe who are afflicted with wandering pains in the joints, eſpecially ſuch as are contracted by cold: the plant is uſed as a vulnerary by the Braſilians.

MANACHA, in *Geography*, a conſiderable town of Arabia, in the province of Yemen, the ſeat of the dola of Harras, and famous for its fairs.

MANACHOKE, a town of Hindooſtan, in Bahar; 26 miles N.W. of Durbungah.

MANACIZO, a town of Naples, in the province of Otranto; 12 miles S.E. of Tarento.

MANACOR, a town of the iſland of Majorca, ſituated in a fertile plain, where perſons of rank and of the moſt conſiderable property ſpend the ſummer ſeaſon. Its population conſiſts of about 7000 inhabitants. It contains a pariſh church, a monaſtery of Dominican friars, and an hoſpital for invalids. The productions of the ſoil in its vicinity are corn of all ſorts, wines, fruits, vegetables, and paſtures for flocks and herds. Proceeding along the coaſt from Manacor towards the eaſt, you paſs San Serveia, and on the north of the village diſcover "Arta," containing near 8000 perſons. This town, built in a mountainous ſituation, is one of the richeſt in the iſland: it contains a pariſh church, a convent, a public oratory, and two chapels of eaſe for the villagers. The land in the neighbourhood affords paſture for cattle of all kinds, and produces wine, olives, corn, and vegetables. The inhabitants cultivate the cotton tree very ſucceſsfully, and make a large quantity of oil.

MANACUS, Manakin, in *Ornithology*. See Pipra.

MANADO, in *Geography*, a ſmall iſland and town, near the north coaſt of the iſland of Celebes. N. lat. 1° 8′. E. long. 124° 32′.

MANAGE, or Manege, an academy, or place for learning to ride the great horſe; as well as for breaking horſes to the proper motions and actions.

The word is borrowed from the French *manege*, and that from the Italian *maneggio*, or ſome will have it, *à manu agendo*, from acting with the hand.

In every manege is a centre, or place deſtined for vaulting round a pillar; a courſe or career for running the ring; and, on the ſide, are pillars, between which are placed the horſes intended for high airs.

Manage, or *Manege*, is alſo uſed for the exerciſe itſelf, either of the horſe or the rider. See Horsemanship.

MANAGUERA, in *Geography*, a town ſituated on the weſt coaſt of Madagaſcar.

MANAKIN, in *Ornithology*. See Pipra.

MANAM, in *Geography*, a town of Africa, in Sugulmeſſa; 16 miles E. of Sugulmeſſa.

MANAMAG, a ſmall iſland in the ſea of Mindoro. N. lat. 11° 27′. E. long. 120° 45′.

MANAMANGALUM, a town of Hindooſtan, in Travancore, near the coaſt of Malabar; 40 miles S.S.E. of Cochin.

MANAMBE, a town on the eaſt coaſt of Madagaſcar. S. lat. 15° 20′. E. long. 50° 5′.

MANAMBOTCHE, a town on the eaſt coaſt of Madagaſcar. S. lat. 15° 50′. E. long 50° 5′.

MANAMBOUVE, a river of Madagaſcar, which runs into the ſea on the ſouth coaſt, S. lat. 25° 20.

MANAN, an iſland of the Atlantic ocean, near the coaſt of Main, in North America; 30 miles in circumference. N. lat. 44° 48′. W. long. 66° 45′.

MANANBATO, a town on the eaſt coaſt of Madagaſcar. S lat. 24° 5′. E. long. 47° 30′.

MANANCIALES, a town of South America, in the government of Buenos Ayres; 190 miles N.N.W. of Buenos Ayres.

MANANGHERA, a river of Madagaſcar, which runs into the ſea on the eaſt ſide of the iſland, S. lat. 22° 45. E. long. 52° 4′.

MANANGOUROU, a river of Madagaſcar, on the ſouth coaſt, which runs into the ſea, oppoſite to the iſland of St. Mary, S. lat. 17°.

MANANZARI, a town on the eaſt coaſt of Madagaſcar. S. lat. 21° 8′. E. long 48° 20′.

MANAPAR, a town of Hindooſtan, in the country of Tinevally, lying on a point of land projecting into the gulf of Manera; 33 miles S.E. of Palamcotta. N. lat. 8° 18′. E. long. 78° 12′.

MANARA. See Manaar.

MANARAN, a ſmall iſland in the ſea of Mindoro. N. lat. 11° 20′. E. long. 120° 51′.

MANARDI, John, in *Biography*, a learned phyſician, was born at Ferrara in the year 1462. He purſued his ſtudies in philoſophy and medicine under that able teacher, Nicholas Leonicens, who was then profeſſor of theſe ſciences at Ferrara, and who took much intereſt in foſtering his talents by private as well as public inſtruction. But Manardi has been accuſed of much ingratitude, in his ſubſequent conduct towards his maſter. In the year 1482 he was appointed medical profeſſor in his native univerſity, and occupied this poſt until 1495; when he quitted Ferrara, and reſided for ſome years with Gian-Franceſco Pico, of Mirandola, to whom he was both phyſician and preceptor, and whom he aſſiſted in publiſhing the work of the celebrated John Pico againſt judicial aſtrology. In 1513 he was invited to become phyſician to Ladiſlaus, king of Hungary: he accepted the appointment, and remained in that country two years after the death of that prince, which occurred in 1516. On his return to Ferrara, he reſumed his functions as a teacher in the beginning of 1519. At an advanced age he married a ſecond wife, young and of great beauty, by which he was ſuppoſed to have ſhortened his days. He died at Ferrara, on the 8th of March 1536, at the age of ſeventy-four; and a very honourable inſcription to his memory was placed on his tomb by his widow. After his return from Hungary, he publiſhed the following works, which are all that he produced: 1. "Medicinales Epiſtolæ Recentiorum Errata et Antiquorum Decreta peritiſſimè referentes," Ferrar. 1521. This work went through numerous editions, the latter of which were much augmented, to the

the number of twenty books, with alterations in the title, *viz.* "Epiſtolarum Medicinalium Libri xx." Baſil, 1540, folio; to which, and ſeveral ſubſequent editions, were added his "Annotationes et Cenſuræ in Joannis Meſuæ ſimplicia et compoſita;" and ultimately, "Curia Medica xx. Libris Epiſtolarum, et Conſultationum adumbrata," Hanov. 1611, folio. Theſe letters were written principally between the years 1500 and 1536. They contain a miſcellaneous collection of remarks, of very various merit, upon the writings and practice of the ancients, with corrections and refutations. Haller terms Manardi a ſemi-Arabiſt and ſemi-Galeniſt; which implies a bold and obſervant mind, attached to the ancient doctrines only when they were not repugnant to cautious obſervation. His cenſures on the practice of the Arabians are often expreſſed with great vivacity; but they are mingled with many uſeleſs and trivial diſcuſſions. He treats of the lues venerea, as a new diſeaſe imported from America, and recommends the cure by guaiacum in preference to mercury. 2. He alſo publiſhed "In primum Artis parvæ Galeni Librum Commentarius," Romæ, 1525, 4to. Gen. Biog. Eloy Dict. Hiſt. De la Med.

MANAS, in *Geography*, a river of Aſia, which runs into the Caſpian ſea, 15 miles N. of Derbend.

MANAS *Hotun*, a town of Thibet; 125 miles N.W. of Tourſan. N lat. 44 58'. E. long. 86 44'.

MANASQUAN, a river of America, in New Jerſey, which runs into the Atlantic, N. lat. 40°. W. long. 74 8'.

MANASSEH, *Half Tribe of*, that lay beyond Jordan, in *Scripture Geography*, was bounded by the tribe of Gad on the ſouth, the Jordan and Semachonite lake on the weſt, the hills of Baſhan and Hermon on the eaſt, and part of the Lebanon on the north. This territory extended from 32° 36' to 33° 36' of latitude, and was more properly called, afterwards, Upper Galilee, or Galilee of the Gentiles. (See GALILEE.) It had ſeveral large territories and conſiderable cities: thoſe of the former ſort were known by the names of Gilead, Batanea, Gaulonitis, Auranitis, Machonitis, Geſhur, Auran or Amram, and Argob; all of them deriving their names from their capitals. The cities of this half tribe were Boſra or Bozrah, Selſcha, Maachah or Maacati, Gerſhon, Aſhtaroth, Adrach or Hadrach-Kedar, or the tents of Kedar, Sueta, Gamala, Eſdrai, Gilead, Pella, Abel, Abel-Maachah or Abel-Beth-Maachah, Jabez-Gilead, Corazin or Corozaim, Julias, Bethſaida, near the deſert of its name, Giraſa or Girgeſha, Hippo, Gader, and Ephron, beſides a number of others of leſs note.

MANASSEH, *Half tribe of*, on this ſide of the Jordan, was ſituated ſouth of the tribe of Zebulun. The territory of this Manaſſeh was hemmed in, N. and S., by Iſſachar and Ephraim, and, on the E. and W., by the Jordan and Mediterranean. It exhibited a variety of plains, mountains, vallies, ſprings, and a good number of ſtately cities; among which were Beth-Shean or Scythopolis, Salem, Aner, Bezech, Abel-Meholah, Caſtrum Alexandrinum, Tirſhah or Terſa, Acrabata, Thebez, Thanac or Tanac, Gath-Rimmon, Maccoth, Ennon, Megiddo, Gilgal, Dor or Dora, Cæſarea Paleſtina, and Antipatris.

MANASWARY, in *Geography*, a ſmall iſland in the Pacific ocean, at the entrance into Dory harbour, near the N. coaſt of New Guinea. In 1775 captain Foreſt found the true nut-meg tree on this iſland.

MANATAWNY CREEK, a river of America, in Pennſylvania, which runs into the Schuylkill, N. lat. 40° 15'. W. long. 75° 40'.

MANATE, a river of Honduras, which runs into the bay, N. lat. 15° 45'. W. long. 88° 22'.

MANATE *Lagoon*, a bay on the coaſt of Yucatan. N. lat. 18° 22'. W. long. 89° 18'.

MANATEE BAY, a bay on the S. coaſt of Jamaica. N. lat. 17° 51'. W. long. 76° 45'.

MANATENGHA, a river of Madagaſcar, which runs into the ſea on the E. coaſt, S. lat. 23° 30'.

MANATI, a town of the iſland of Cuba, in a bay on the N. coaſt. N. lat. 24° 32'. W. long. 76° 20'.

MANATI, or *Sea-cow*, in *Zoology*. See TRICHECUS *Manatus*.

MANATI *Lapis*, a name given to a bone, of which there are two found in the head of the manati, or ſea-cow; they are roundiſh, and are uſually of the ſize of a hand-bell. They are ſaid to have great virtues againſt the ſtone and gravel, when burnt to aſhes, and given in white wine. The world need not, however, regret the ſcarcity of this remedy, for probably any animal bone, when burnt to aſhes, is poſſeſſed of all its virtues.

MANATIRSKA, in *Geography*, a town of Ruſſia, in the government of Irkutſk, on the Itchora; 84 miles N.N.E. of Kirenſk. N. lat. 58° 45'. E. long. 109 44'.

MANATOULIN, a chain of iſlands in lake Huron, extending 90 miles in length, and about ſix in breadth. The term, according to Carver, ſignifies in the Indian language the place of ſpirits, and the iſland is eſteemed ſacred by the Indians. N. lat. 45° 20' to 45° 49'. W. long. 81° 50' to 84°.

MANAZERUDAM, a diſtrict or province of Turkeſtan, N. of Fergana.

MANBAGE, a town on the S. coaſt of the iſland of Sibu. N. lat. 10 10'. E. long. 123° 38'.

MANBALLA, in *Zoology*, the Ceyloneſe name of a ſpecies of ſerpent, called alſo the *canine*, or *dog-ſerpent*, from its manner of flying at every thing that comes in its way, as our dogs do: it is of a deep brown colour, beautifully variegated with white.

MANBED, in *Geography*, a town of Perſia, in the province of Irak; 174 miles E.S.E. of Iſpahan.

MANBONA, the capital of the kingdom of Sabia, in Africa, ſituated on the ſea coaſt, at the entrance of the channel of Mozambique; 30 miles S. of Sofala. S. lat. 20° 45'.

MANBOOM, a town of Bengal; 54 miles N.W. of Midnapour. N. lat. 23 6'. E. long. 87 28'.

MANBOTE, in our *Old Writers*, a compenſation or recompence for homicide, particularly due to the lord for killing his man or vaſſal.

MANC, in *Geography*, a town of Grand Bucharia; 50 miles W. of Badakſhan.

MANCA, a town of America, in Weſt Florida, on the E. bank of the Miſſiſippi, at the mouth of Hona-chitto river.

MANCAENBLANCA, a town of the iſland of Borneo; 30 miles N. of Negara.

MANCANILLA, in *Botany*, a name given by Plumier to a genus of plants, ſince characteriſed by Linnæus in the name of *hippomane*; which ſee.

MANCENILLA, in *Geography*, a large bay on the N. ſide of the iſland of St. Domingo, about 4000 fathoms long from weſt to eaſt, and 2800 broad from north to ſouth. The S.E. part is very wide, and affords excellent anchorage even for veſſels of the largeſt ſize. In other parts it is too ſhallow. The river Maſſacre, which ſeparated the French and Spaniſh colonies on the N. ſide of the iſland, runs a N. courſe towards its mouth N.W. and enters the eaſtern part of the bay. The river ſwarms with fiſh, particularly with thoſe large mullets, which are highly prized at Cape François. Fiſhing in the bay is difficult on account of the drifted wood, but

but the negroes, being good divers, plunge to the bottom and disengage the feine, in doing which, the negroes, fifh, and alligators are engaged in an amufing kind of conteft. The negroes kill the alligators, knock out their teeth, and fell them for making corals, which ferve to mark the luxury and pride of thofe who fufpend them to the necks of their children. The plenty of fifh often attracts fhips of war to this bay. The mouth of Maffacre river lies in N. lat. 19° 44'. W. long. from Paris 74° 9'.

MANCHA, La, an extenfive province of Spain, north of New Caftile, by which it is bounded on one fide, on the W. by Eftramadura, on the S. by Cordova and Jaen, and on the E. by Murcia and Valencia. It is 43 leagues long and 33 broad; and divided into Upper and Lower. The capital of the former is Ciudad Real, and that of the latter Occana. The foil is in general dry and dufty; and the country abounds in plains of confiderable extent, but they are wafte and almoft wholly without trees. The rivers that water it are little more than rivulets. A great part of the province is furrounded by mountains, forming part of the chain beginning in Sierra d'Occa, called by the ancients "Montes Orofpadani." The moft confiderable of thefe mountains is the Sierra d'Alcarrez, extending from N. to S., towards the fouthern and eaftern parts of the kingdom of Jaen. In La Mancha alfo, near Alcarrez, and at the fide of the Sierra of that name, begins the famous Sierra Morena, or the "Montes Mariani" of the Romans. They continue to the kingdom of Cordova; a ridge fpreads into Jaen, and they extend as far as Eftramadura, and even to the banks of the Guadalquivir. The province of La Mancha contains 111 parifhes, 78 monafteries and convents, two cities, and 121 towns, of which ten belong to the crown, and 75 to the military orders, 46 villages, one intendency of a province, and one hofpital. The principal towns are Ciudad Real, Occana, Alcafar, and Almagro.

Ciudad Real, which is reckoned the capital of La Mancha, is fituated in a plain, which is rich, and productive of corn, wine, and fruits. This city has loft much of its ancient fplendour; its woollen manufactures and trade have much declined, and its population is of courfe reduced to the number of eight or nine thoufand perfons. The town is regularly laid out; the ftreets are ftraight and well paved; and it has a fquare 150 paces long, and 75 broad, furrounded with two rows of boxes for the accommodation of the fpectators at bull-fights and public fhows. This place is the refidence of the intendent of La Mancha, and the grand vicar and ordinary of the archbifhop of Toledo, and the principal place within the controul of a corregidor. In the parifh church of St. Mary is a fpacious and lofty chancel; the chief altar of which is compofed of four different orders of architecture, each of which is ornamented with pillars, upon the whole well executed. A great quantity of leather for fhoes was formerly prepared in this city, and a confiderable manufactory of them was eftablifhed. The cardinal of Lorenzana, the archbifhop of Toledo, erected at his own expence a hofpital, which coft about 12,500*l.* fterling; and he alfo fet on foot a manufactory of flannels and coarfe woollen cloths; and he lately propofed to eftablifh another of filks. For an account of the other towns, fee the refpective articles. The population is rather more than 200,000 inhabitants, or, according to the furvey of 1787 and 1788, 206,160; and the clergy not numerous. The Mefa d'Occana is the richeft and moft fertile plain in the whole country.

La Mancha is a flat level country, and the foil is parched with heat. The productions of fuch a foil muft neceffarily be limited; it produces corn, and efpecially oats, in fufficient quantity to fupply the neighbouring provinces. But the principal part of the country is fo deftitute of trees, that for feveral leagues in fucceffion you fcarcely fee one. The moft common trees are chefnuts of a dwarf fpecies, which grow fpontaneoufly; olive trees, however, are found in many parts, and alfo a number of vines, the beft of which are thofe of *Menzanares*, which fee. The other productions of La Mancha are faffron, honey, and fpar. No fruit is to be met with except in fome particular diftricts, and in fmall quantities. Almagro is famous for melons and potatoes. The meadows are not numerous, except for about four leagues between Ciudad Real, and Santa Cruz de Mudela, where they are fine and extenfive; immenfe herds are fed in thefe plains, and efpecially mules, which are of an excellent breed. The manufactures of La Mancha are now declined. They formerly fabricated ribbons, garters, worfted ftockings, tapeftry, and filks of different forts, and a great quantity of leather-gloves, both at Ciudad Real and Occana: at the former of thofe towns they made all forts of woollen ftuffs, but they have very much declined. A fabric of blond lace has been lately fet on foot at Almagro, which employs 2300 people. The other branches of labour are reduced to four; one of hard foap at Occana; another of flannels at the fame place and Campo de Criptance; a third at Alcazar de St. Juan, of gunpowder; and three refining-houfes of faltpetre at Pedronera, Zemblaque, and Alcazar de St. Juan, the laft of which furnifhes annually 200,000 quintals of faltpetre to the crown, on whofe account it is wrought. The wool fpinning is a confiderable fource of induftry throughout this province, and employs from 12 to 16,000 people of all ages and fexes. Commerce is in a very low ftate in this province: the only productions with which it furnifhes the neighbouring provinces are a little fpar, oats, and wine, together with a fmall quantity of blond lace and fhoe-leather. But thefe few articles do not counterbalance the imports from other provinces and countries, which fupply La Mancha with fhot, fpices, falt provifions, hardware, linen, muflins, broad cloth, fine woollen ftuffs, filks, and in a word all articles of luxury, and even many of neceffity with regard to clothing. The animal and vegetable kingdoms prefent nothing worthy of much attention in this province: but it has fome mines and mineral waters that may deferve notice: fuch are mines of iron, ochre, rock-cryftal, bole, calamine, antimony, cinnabar, &c. It has alfo mineral waters both for drinking and bathing. In the cultivation of the arts and fciences, La Mancha does not excel. The manners of this province differ little from thofe of Caftile. The people, fays La Borde, are more grave and folemn in their deportment, and more attached to ancient cuftoms and ceremonies, and their conftitutions more robuft and fit for labour: their temper in general is mild and peaceable, and they are truly good-humoured. Perfons in the higher ranks pafs their lives in eafe and apathy; on the other hand, the common people are laborious and frugal; and both orders, fays La Borde, take no part in any fort of diffipation, or even of diverfion. Every thing is grave and formal. Other travellers, however, report, that this is the moft cheerful country in Spain; that the inhabitants are very fond of mufic and dancing. A player on the guitar, and a finger of fequidillas, are perfons in great requeft in this part of the country. The girls, young men, and married women are faid to affemble at the firft found of the inftrument; the beft voices fing fequidillas, and the blind accompany them on their inftruments. A late traveller fays, "there is no labourer nor young female peafant who is not well acquainted with Don Quixote and Sancho." The traveller, fays another writer, can fcarcely enter

ter the province of La Mancha without having conftantly in his thoughts the fabulous hero, whofe name renders this country more celebrated than its fpacious and parched-up plains could ever have made it. Cervantes, in his endeavours to ridicule the tafte for romances, perhaps has left only a fofter recollection of the fpirit of chivalry, which his hero, notwithftanding his madnefs, always renders venerable. The names of Quintenar and Tobofo are impreffed on the memory of every one, and one looks round for the village of the famed and peerlefs Dulcinea, and the wood where the firft meeting took place between her and the doughty Don Quixote. The coftume of all ranks of the people, in the principal towns of this diftrict, is fimilar to that of New Caftile. The peafant wears a clofe camifole of cloth, or leather, faftened with a leathern girdle, and on his head a fquare cap rifing to a point. The fides, which are turned up, continually beat againft each other: it is made of cloth, or leather, and is called a "montera." A ftranger, who vifited fome of the affemblies of amufement in this province, would be aftonifhed at feeing a labourer in the drefs of Sancho, wearing a broad leathern girdle, become an agreeable dancer, and perform all his fteps with grace, precifion, and meafure. The fongs and fequidillas on thefe occafions are peculiar to this part of the kingdom, and it is to be remarked, that to finging and dancing the Manchegas add the merit of poetry. Moft of the fequidillas are voluptuous, and turn on the fubject of love or abfence; though fome are fatirical.

MANCHAC, a town or parifh on both fides of the Miffifippi, in Louifiana, extending 12 miles on the river. See LOUISIANA.

MANCHE, LA, the *Channel*, one of the nine departments of the N.W. region of France, compofed of Cotantin and Avranchin, and oppofite to Jerfey and Guernfey, in 49 N lat. The five circles into which it is divided are Valognes, containing 143,777 inhabitants, St. Lo, including 90,329, Mortain 69,565, Avranches, 94,711, and Coutances, 130,530. The foil, partly fandy and partly marfhy, is better adapted to pafture than cultivation: it produces, however, fome grain, flax, hemp, fruits, and roots. It has mines of copper, iron, and cinnabar, with mineral fprings. Salt, in confiderable quantities, is manufactured and exported. For a further account of this department, fee CHANNEL.

MANCHESTER, a market town in the hundred of Salford and county of Lancafter, England, is feated on the banks of the fmall rivers Irk, Medlock, and Irwell, at the diftance of 185 miles from London and 32 from Liverpool. In point of commercial and political importance, though not a corporation, it is undoubtedly the fecond town in the kingdom. The whole population, according to the parliamentary cenfus of 1800, amounted to 84,053 perfons, of whom 44,500 were engaged in different branches of trade: 44,900 were females, and 39,110 were males. The amazing increafe of population in this town is fhewn by returns obtained in the years 1773 and 1811. In the former year there were 29,951 perfons; and in the latter 98,573. The parifh of Manchefter comprehends feveral of the contiguous townfhips, the whole population of which is 136,370.

Manchefter appears, from the teftimony of Mr. Whitaker, to be a town of great antiquity. A ftation occupied by the ancient Britons is fuppofed to have been fettled here 500 years before the Chriftian era. It did not, however, deferve the name of a town till after the invafion of this ifland by the Romans, when it became one of the fortified retreats of the brave but undifciplined natives. At this period it was called Mancenion, that is, the "place of tents;" but Agricola, who conquered it A.D. 79, changed its name to Mancunium. It was afterwards called Manduefuedum, and Mancaftre, from which latter term its prefent appellation is evidently derived. The Romans, upon achieving the conqueft of this ftation, built an extenfive caftle upon the fpot now denominated Caftle-field, fituated near the conflux of the Medlock with the Irwell; but every veftige of this is removed to make room for modern buildings. After having retained it in continued poffeffion for fomewhat more than 400 years, the declining fortunes of Rome compelled the legionary foldiers to abandon it to the original poffeffors, who in their turn foon yielded it to their new conquerors and tyrants the Saxons. During the dynafties of that ferocious people, Manchefter was feveral times a place of military conflict, being feated on the immediate confines of the Northumbrian kingdom. Edward the Elder, king of the Mercians, is faid to have fortified and rebuilt a confiderable part of it, which time and violence had united to deftroy. At the period of the grand Domefday furvey, two churches appear to have exifted here, called St. Mary's and St. Michael's. Albert de Grefley obtained from the Conqueror the lordfhip of the manor. In 1301 his grandfon, Thomas, granted a charter to his burgeffes of Manchefter, conftituting their town a free borough. Lord de la Warr, the laft male heir of this family, laid the foundation of the collegiate church, which tended, in no fmall degree, to promote its increafe and improvement. This town in early times was a place of fanctuary, and one of the eight places to which that privilege was confirmed by Henry VIII. in 1540. The year following, however, it was removed to Chefter, which the ftatute declares "had a ftrong gaol and a mayor, and had not the wealth, credit, great occupings and good order which Manchefter had." In 1605, a peftilence raged here, and carried off upwards of 1000 perfons. Upon the breaking out of the civil war between Charles I. and the parliament, Manchefter decidedly efpoufed the republican caufe, and fuccefsfully refifted feveral fieges by the royal army, under the earl of Derby. Notwithftanding thefe circumftances, however, the inhabitants feem to have honoured the reftoration of Charles II. with particular marks of joy.

From this fhort fketch it will readily be perceived that, in an hiftorical point of view, Manchefter is only entitled to a very fmall fhare of general attention: though regarded as a manufacturing town, it is defervedly diftinguifhed above every other in England. When it firft began to be noted for its manufactures is uncertain; but in the time of Edward VI. Manchefter cottons, Manchefter rugs, and Manchefter friezes are frequently mentioned in various acts of parliament. In 1650, its trade is defcribed as "not inferior to that of many cities in the kingdom, chiefly confifting in woollen friezes, fuftians, fack-cloths, mingled ftuffs, caps, inkles, tapes, points, &c. whereby not only the better fort of men are employed, but alfo the very children by their own labour can maintain themfelves. There are, befides, all kinds of foreign merchandize brought and returned by the merchants of the town, amounting to the fum of many thoufand pounds." About this time great quantities of linen yarn feem to have been imported here from Ireland, which being wrought into cloth, was refhipped for the Irifh market. It was not, however, till after the middle of the laft century, that Manchefter rofe to a pre-eminent rank among our manufacturing towns; a rank for which it is chiefly indebted to the ingenuity and invention of Mr. Hargreave and fir Richard Arkwright. Previous to the year 1760, all the cotton yarn manufactured in the country was fpun by hand, upon that well known domeftic inftrument called

called a one-thread wheel. Shortly after this period, Mr. Hargreave conftructed a machine denominated a *jenny*, by which one perfon was enabled to fpin from twenty to forty threads at a time. Thefe machines foon came into general ufe, but were much limited in their employment till the year 1775, when fir Richard brought the improvements of his predeceffor to much greater perfection. This gentleman having eftablifhed his extenfive manufactories here, made Manchefter the principal feat of the fpinning trade, the rapid increafe of which produced a correfponding increafe in the buildings and population of the town. See the preceding articles of ARKWRIGHT, vol. ii. and COTTON, vol. x. for further particulars. In Brayley's "Beauties of England," vol. iii., Derbyfhire, is an interefting and ample memoir of fir Richard Arkwright, with accounts of the prefent ftate and proceffes of the cotton manufactures.

As Manchefter, notwithftanding its extent and political importance, is not a corporate town, the government is vefted in a headborough, called the boroughreeve, and two conftables. Thefe are chofen annually from the moft refpectable of the inhabitants by a jury impannelled by the fteward of the manor, at the courts leet, which are held by the lord of the manor twice every year at Eafter and Michaelmas. The boroughreeve is ufually one of the gentlemen who has ferved as conftable for the preceding year, and is treated perhaps with more refpect (the paraphernalia of a mace-bearer excepted), than any mayor in the kingdom. The chief duty of this officer is to prefide at public meetings, and to diftribute certain charities, denominated "boroughreeve charities," all the judicial functions connected with the police being executed by the conftables and their deputies. A court of requefts is held every month for the recovery of fmall debts; and every Wednefday and Saturday feveral refpectable magiftrates fit in the court-room of the New-Bayley for the adminiftration of juftice in pleas of almoft every defcription, whether civil or criminal. Quarter feffions alfo are held four times a-year; and, from prefs of bufinefs, the court is fometimes obliged to continue its fittings for nearly a fortnight.

This town is divided into two portions by the river Irwell, which receives the Irk at a fhort diftance from the collegiate church. The fituation of Salford is very fimilar to that of Southwark, the communication between the two towns being kept up, as in London, by three bridges thrown acrofs the river at different places. The moft ancient of thefe is called the "Hanging bridge," Old, or Salford bridge, and is fuppofed to have been originally founded in the time of the Romans. The prefent, built in the reign of Edward III., was formerly very dangerous for foot paffengers, but in 1778 it underwent a thorough repair and extenfion. Blackfriar's bridge, erected about fifty years ago, is conftructed entirely of wood, and flagged for foot paffengers only. But the fineft bridge over the Irwell is the New bridge, commonly called the New Bayley bridge, which was founded in 1785, and is conftructed wholly of ftone. It confifts of three large arches, and a fourth of fmaller dimenfions, left open in fupport of the duke of Bridgewater's right to a towing path to his quay, in Salford, agreeably to the tenor of the act, enabling His Grace to form his extenfive canals. Six bridges are here thrown acrofs the Irk, the chief of which are Huntfbank bridge, fituated near the college, and Scotland bridge: nine are thrown over the Medlock, which runs in a ferpentine courfe through the fouthern fuburbs of the town. Oxford-ftreet bridge forms a part of a ftreet of that name. A variety of other bridges lie acrofs the numerous canals which interfect the fuburbs at different places, and at Knotmill, in the vicinity of Caftle-field, is a very noble tunnel, through which the Rochdale canal paffes, not far from its junction with that of the late duke of Bridgewater's.

With refpect to the plan and buildings of this town, it may be remarked, that the portion of it called the Old Town confifts of a very motley affemblage of old and new houfes, clofely huddled together, and exhibiting little elegance in their exterior appearance. Even the new ftreets, though much fuperior to the old, are ufually narrow, except in a few inftances where they have been improved by the acts of 1775 and 1791. In thefe latter, however, there are a number of very excellent modern buildings. Mofley-ftreet and Portland place would do honour to the capital itfelf. Grofvenor-fquare, when finifhed, will probably rival the fineft in the kingdom. The fuburbs of Ardwick-green and Salford crefcent are peculiarly pleafant, and contain fome handfome houfes, which are moftly occupied by the wealthy manufacturers.

The churches and other public edifices of this town are numerous, but few of them are diftinguifhed for architectural beauty. The College, or parifh church, founded, as already mentioned, by lord de la Warr, bifhop of Durham and rector of Manchefter, is a venerable building in the rich ornamented ftye of the 15th century. In the interior its appearance is confufed and heterogeneous. The windows ftill retain many rich remains of the painted glafs with which they were formerly ornamented. The roof is of elegant wood-work, interfperfed with carved figures of angels playing upon different mufical inftruments. In front of the gallery, on each fide of the clock, are fufpended the colours of the 72d regiment, raifed in this town by fubfcription during the American war, whofe noble conduct at the fiege of Gibraltar is ftill remembered with exultation by every lover of his country, and particularly by the inhabitants of Manchefter. Adjoining to this church are a number of fmall chapels well worthy of the attention both of the architect and the antiquary. A view of this church, with a particular account of its hiftory and architectural peculiarities, written by J. H. Markland, F. S. A. are given in the third volume of "The Architectural Antiquities of Great Britain."

St. Ann's church, fituated at the end of the fquare to which it gives name, is diftinguifhed for its handfome appearance. It was founded by lady Ann Bland in 1709, in compliment to whom it was dedicated to the faint whofe name it bears. The church of St. Mary, fituated between Deanfgate and the river Irwell, is admired for the beauty and fine proportions of its fpire, which meafures 186 feet in height. The lanthorn which fupports it is peculiarly ftriking, being compofed of eight noble Ionic pillars, furmounted by a large globe, upon which is placed a maffy crofs. St. John's church is built in the ftyle which is called modern Gothic. In the veftry are feveral pictures, and a beautiful window of ftained glafs. Two of the windows in the body of the church are alfo decorated with fine painted glafs. The other churches in this town are St. Paul's in Turner-ftreet, St. James's in George-ftreet, St. Michael's in Angel-ftreet, St. Clement's in Lever-ftreet, St. Stephen's near Bolton-ftreet, St. George's in the neighbourhood of Newton-lane, and St. Peter's, which terminates the profpect down Dawfon-ftreet and Mofley-ftreet. The latter was defigned and executed by James Wyatt, efq. In Salford is Trinity chapel, a neat ftone edifice of the Doric order.

Befides thefe churches there are three others alfo belonging to the eftablifhment, fituated in the adjoining townfhips of Ardwick, Chorlton, and Pendleton, which, from their vicinity to Manchefter, may not improperly be confidered as belonging to it. Numerous chapels and meeting-houfes, appropriated for the public worfhip of diffenters of almoft every denomination

denomination, are likewife difperfed through various parts of the town. Catholics are numerous here, and the Methodifts are found to comprife a very confiderable proportion of the whole population.

The vaft number of excellent charitable inftitutions with which Manchefter abounds are highly creditable to the benevolence, liberality, and public fpirit of its inhabitants. Indeed, in this refpect, this town is not furpaffed by any in the Britifh empire, whether the fuitablenefs of the buildings for their refpective purpofes, or the liberal contributions by which they are fupported, are taken into view. Among thefe eftablifhments, Chetham's-Hofpital, commonly called the College, is firft deferving of notice, by priority of foundation. It owes its exiftence and entire fupport to the munificent bequeft of Humphrey Chetham, efq. of Clayton, whofe will is dated the 16th of December 1651. At firft, the number of boys clothed and educated here amounted only to forty; but from an increafe in the value of the eftates belonging to the foundation, the number was augmented more than thirty years ago to eighty. The building appropriated to this charity is fituated on a lofty rock, near the confluence of the rivers Irk and Irwell, immediately adjoining to the collegiate church already mentioned, to which indeed it formerly belonged. Upon this fpot Mr. Whitaker fuppofes the Romans had their prætorium, or fummer camp; and certainly the fituation was admirably adapted for that object. In a large gallery, in this edifice, is a public library, likewife founded by Mr. Chetham, which now contains upwards of 15,000 volumes in various languages, and in almoft every branch of fcience or literature, befides fome very valuable manufcripts. The Infirmary, Difpenfary, Lunatic Hofpital, and Afylum, are all included in one fpacious building, fituated in the front of Lever's Row, which is confidered as the higheft ground in the town. The foundation of the firft edifice was laid in 1753, for the reception of forty patients; but the number was foon afterwards doubled, and now there are 160 beds appropriated for the ufe of the fick. The Lunatic Hofpital was opened in 1766, and the Difpenfary in 1792. The annual fubfcriptions for the fupport of thefe inftitutions, amount to feveral thoufand pounds. Here are two poor-houfes, one of which was erected in 1792, on the fide of the Irk, nearly oppofite the College; and the other built the year following, at the upper end of Greengate in Salford. Both of them are handfome buildings, and admirably fitted up for the purpofe to which they are appropriated. The Lying-in-Hofpital was inftituted in 1790, and not only provides profeffional aid for in-door patients, but likewife for the affiftance of fuch poor married women as find it inconvenient to leave their own houfes. The Houfe of Recovery is intended chiefly for the reception of patients afflicted with contagious fevers. The other principal charities are the ftrangers-friend-fociety, inftituted in 1791, and the boroughreeve's charity: the former defigned for the relief of ftrangers, and the latter for the aid of the poor inhabitants in general. The Free-fchool is an excellent foundation, which owes its origin to Hugh Oldham, bifhop of Exeter. In this fchool the greater part of the clergy of the town and neighbourhood have been educated, as well as many noblemen. There are, befides, feveral inferior charity and Sunday fchools in various parts of Manchefter.

Though in every refpect a manufacturing town, Manchefter has not wholly neglected the promotion of literature and fcience. Societies, having this object in view, are numerous. The chief of them are the Literary and Philofophical, inftituted by Dr. Thomas Percival in 1781; and the Philological Society, which commenced its meetings in 1803. Here are alfo two very extenfive public circulating libraries; the former founded in 1757, and the latter in 1792. The Manchefter Agricultural Society was eftablifhed in 1767, and has for its object the encouragement of the ufeful arts in general, by the diftribution of premiums for fcientific difcoveries. A laudable practice is alfo adopted, of granting preminms to cottagers, who fupport their families without parochial aid; and in fome inftances likewife, honeft and good fervants are rewarded by honorary prefents. The repofitory, defigned to encourage and reward induftrious females, has proved highly ferviceable to many individuals, and is therefore juftly entitled to liberal and careful fupport.

Befides thofe already noticed, many other public buildings and inftitutions, intended either for ufeful purpofes or for amufement, may properly claim attention in this place. The Theatre, a commodious and extenfive building, was erected in 1807. It is open during feven months of the year, and can in general boaft of a very refpectable company of performers. The gentlemen's Concert-room is elegant and capacious, and will accommodate upwards of 1200 perfons. This is fupported by a voluntary fubfcription; and ftrangers are admitted with a fubfcriber's ticket. There are likewife very excellent new and commodious affembly-rooms for balls, card-affemblies, &c. The New-Bayley, or Penitentiary houfe, is well deferving attention, both on account of the extent of the edifice and arrangement of its parts, and alfo for the economy obferved in the interior. Immediately above the entrance is a large room, where the feffions are held; and adjoining to it are feveral commodious rooms for the magiftrates, jurors, &c. Beyond this, in the centre of a large area enclofed by lofty walls, ftands the prifon, an extenfive building in the fhape of a crofs, three ftories high. It is remarkable for the cleannefs with which it is kept, as well as for its regulations. Prifoners, not confined for capital crimes, are allowed the free exercife of their refpective trades. A workhoufe, on a large fcale, has alfo been lately built.

A new ftructure, called the Manchefter Commercial Building, or Exchange, was commenced in the year 1806, from defigns by Mr. Harrifon, architect. It was completed in January 1809, and is appropriated to the ufe of the merchants and manufacturers of the town, who fubfcribed certain fhares of 50*l*. each, to defray the expences of its erection. The building comprifes an exchange-room, dining-room, drawing-room, ware-rooms, fhops, and counting-houfes, a fuite of rooms for the poft-office, with extenfive cellars under the whole. It is built of ftone, and prefents a fimple, but claffical façade, with demi-columns of the Grecian Doric order. The exchange-room is very fpacious, containing an area of 4000 fuperficial feet, in the centre of which is a glazed dome, 40 feet in height, fupported by eight fluted columns of the Ionic order. Over a part of this room is a gallery, or femicircular fuite of rooms, appropriated to an extenfive library, belonging to Mr. Ford, a refpectable bookfeller of this town, whofe large catalogue contains a valuable affortment of fcarce, curious, and interefting works.

The Trade of Manchefter confifts chiefly, but not entirely, in the manufacture of cotton goods. Velverets, checks, a variety of fmall articles, fuch as filleting, tapes, laces, gartering, &c. are likewife made in great quantities. The filk manufacture has advanced rapidly here within the laft ten years; and a manufactory for making and finifhing hats is now carried on to a great extent. The profufion of goods made here is conveyed, by means of the Irwell and the numerous canals which interfect the town, to different ports both on the eaftern and weftern coaft. Liverpool, however, is the principal mart for the exportation of the cottons; and between

tween that town and Manchefter there is a conftant and rapid communication both by land and water-carriage.

Manchefter has two markets, called the old and the new, both of which are held twice a week on Tuefdays and Saturdays: the latter is the principal one for provifions; the former being moftly frequented for tranfacting the manufacturing bufinefs of the town with the country traders. Moft of the ftreets are paved and lighted, and are guarded at night by about 200 watchmen. For the regulation of parochial affairs, Manchefter is divided into fourteen diftricts. It gives title of duke to the noble family of Montague, fome of whom have been diftinguifhed characters. In the paths of literary fame, however, it can claim little diftinction; but Byrom and Falkner may be properly ranked with what Fuller calls "the worthies of the place."

The environs of this town abound with old manfions, refpectable villas, and a number of modern feats. Ancoats-hall, the manorial manfion-houfe, is a venerable building, the parts of which are difpofed in a moft curious and grotefque manner. Hulme-hall, or Holme, is an edifice of a fimilar kind, exhibiting a remarkable fpecimen of ancient domeftic architecture. It ftands on the edge of a fhelving bank of the Irwell, and exteriorly offers to the view a moft romantic and picturefque object. Heaton-houfe, the feat of the earl of Wilton, lies about four miles to the north-eaft of the town. The houfe, a handfome modern ftructure of ftone, ftands on a commanding fituation, in the midft of a very noble park, finely decorated with venerable trees and numerous thriving plantations. The other principal feats are Trafford-houfe, Alkington, and Smedley-hall; near which laft is Broughton-hall, formerly the property of the Stanleys, earls of Derby. Every part of the furrounding country difplays the higheft ftate of agricultural improvement, and in times of profperity prefents one vaft fcene of enterprize and induftry. Beauties of England and Wales, vol. ix. Aikin's Hiftory of Manchefter, and its Environs, 4to. by J. Afton. The Manchefter Guide, 12mo. 1804. Whitaker's Hiftory of Manchefter, 2 vols. 4to. 1771.

Manchester, a poft and fifhing town of America, on the fea-coaft between Cape Anne and Beverly, in the county of Effex and ftate of Maffachufetts. This townfhip was incorporated in 1645 and contains 1082 inhabitants.—Alfo, a poft-town of Vermont, in Bennington county, on Battenkill; 22 miles N.E. of Bennington and 59 N.E. of Albany in New York; the townfhip containing 1397 inhabitants.—Alfo, a townfhip in York county, Pennfylvania, including 1175 inhabitants. Weft Manchefter, in the fame county, contains 794 inhabitants.—Alfo, a fmall poft-town of Virginia, on the S. fide of James river, oppofite to Richmond, with which it is connected by a bridge.—Alfo, a town of Nova Scotia, 10 leagues N.W. of Cape Canfo, which in 1783 contained 250 families.

Manchester *Houfe*, a factory belonging to the Hudfon Bay Company, 100 miles W. of Hudfon's houfe and 75 S.E. of Buckingham houfe; fituated on the S.W. fide of Safkafhawan river, in the N.W. part of North America. N. lat. 53° 14′ 18″. W. long. 109° 20′.—Alfo, a poft-town in Adam's county, on the N. bank of the Ohio, about 10 miles above Maffiefburgh; incorporated in January 1802.

MANCHICOURT, Pierre, in *Biography*, a native of Bethune, in Artois, and director of the mufic in the cathedral of Dornick, who flourifhed in the middle of the fixteenth century, and whofe name frequently appears among the compofers of motets and fongs, in four and five parts, does not reward lovers of mufic of this period for the trouble of fcoring his productions fo much as many of his contemporaries; and, indeed, in three or four of them that we have examined, he feems not only a dry but a clumfy contrapuntift.

MANCHINEAL Harbour, in *Geography*, a bay on the E. coaft of Jamaica. N. lat. 18° 4′. W. long. 75° 58′.

Manchineal, in *Botany*. See Hippomane.

Dr. Peyffonnel, in his obfervations on the fruit of this tree, informs us that the favages ufe the juice of it to poifon their arms, the wounds of which are thereby rendered mortal; that the rain which wafhes off the leaves, and falls on the human body, caufes blifters to rife like boiling oil, and that even the fhade of the tree is fatal to thofe who fit under it. However, timely application by purges and emetics have prevented their ill effects. Phil. Tranf. vol. l. art. 105. p. 772.

MANCHULL, in *Geography*, a town of Hindooftan, in the circar of Joodpour; 19 miles S. of Joodpour.

MANCIAT, a town of France, in the department of the Gers; 16 miles S.W. of Condom. N. lat. 43° 59′. E. long. 0° 7′.

MANCINELLA, in *Botany*. See Hippomane.

MANCINI, Francesco, in *Biography*, compofed an oratorio which acquired him great reputation, intitled "L'Amor divino trionfante nella morte di Crifto;" and hymns for the Florentine brotherhood of the Pietà, during Lent, which were publifhed at Rome in 1700. Mancini was a Neapolitan, and, feemingly, the firft opera compofer of eminence in that country during the laft century. Between the years 1700 and 1731, he produced feveral operas and intermezzi that were much efteemed by the firft profeffors of his time, particularly Haffe and Geminiani, who always fpoke of him as a very able mafter. The celebrated opera of *Idafpe fidele*, or Hydafpes, brought on our ftage in 1711 by Nicolini, was fet by Francefco Mancini. In this opera it was, that Nicolini's battle with the lion gave birth to Addifon's humorous papers on the fubject, in the firft volume of the Spectator.

Mancini, Thomas, fon of the chapel-mafter of Groningen, and one of the 53 examiners of the organ erected in that city in 1596, recorded by Werckmeifter, in his "Org. Gruning. Rediv." See Organ, and Werckmeister.

Mancini, Giambatista, maeftro di canto della corte Imperiale, or finging-mafter to the Imperial court, and Accademico filarmonico, publifhed in 1774, at Vienna, a treatife on finging in 4to. intitled "Penfieri e Rifleffioni pratiche," or practical thoughts and reflexions on figurative fong; a work of merit, fuperior to any treatife on the fame fubject that has appeared fince the time of Tofi. The author was a fcholar of the famous Bernacchi, the celebrated difciple of Piftocchi, the founder of the Bologna fchool of finging, and mafter, not only of Mancini, but of Amadori, Guarducci and Raof, the celebrated tenor, all renowned opera fingers of the firft clafs during the laft century.

In the IId article, or fection of this book, the author gives a lift and character of all the moft celebrated opera fingers, male and female, from the time of Piftocchi down to Pacchiefatti and the Gabriele.

In the IIId fection he defcribes the vocal organ, its feveral parts, phyfical defects, and qualities neceffary to its perfection.

IV. Of the *voce di petto*, voice from the cheft; *voce di tefta*, *tesla*, or falset, and the art of uniting them, that is, the natural voice that comes from the chest, and the feigned voice that is merely formed in the throat, and the uniting them in such a manner, that the hearer cannot distinguish where nature ends and art begins.

V. Of intonation.

VI. Of the manner of opening the mouth, and emission of voice free from the teeth, nose, and throat.

VII. Of the portamento, and manner of forming, modulating, and conducting the voice.

VIII. Of the union of different registers of voice, of the apoggiatura and concealment of defects.

IX. Of the *messa di voce*, or swell, and description of the voice of Farinelli.

X. Of the shake and beat. The author calls the trill or shake the support, ornament, and life of song; "Oh trillo! sostegno, decoro, e vita del canto." Describes the shake *alla capro, alla cavallo*, or that resembles the goat's cough, or the neighing of a horse.

XI. Of the cadence or close.

XII. Of agility of voice or rapid execution.

XIII. Of the knowledge and accomplishments necessary to appearing on the stage as a public singer.

XIV. Of recitative and action.

XV. Of the sobriety and regularity of conduct necessary to a student in singing.

The author in conversation mentioned to us at Vienna, what he has since inserted in his book, a curious operation performed at Naples by signior Francisco Piccillo, an eminent surgeon, on the organ of voice, by cutting the glands of the throat, when so inflated or prominent as to obstruct the free passage of the voice. It is certain, says signior Mancini, that the glands of the throat may be safely removed, but it is likewise equally certain that the defect still remains. The operation was performed at Naples on three several persons in a most dextrous manner, with two cane-knives, without however meliorating the voice.

The ingenious author of this useful tract, who had himself been a capital vocal performer on the opera stage, and drew his rules from long practice and experience, died at Vienna about 1779. A third edition of the "Pensieri e Reflessione," and Mancini's "Treatise on Singing," appeared at Milan in 1778.

MANCIPIUM, or Manceps, in the language of ancient jurisprudence, was a name used to distinguish those spoils that were taken with the hand; and whenever they were sold or *emancipated*, the purchaser required some assurance that they had been the property of an enemy, and not of a fellow-citizen.

MANCIPLE, Manceps, in *Old Authors*, denotes a caterer. There was anciently an officer in the Temple called by this name, who is now called the steward; and both name and office are still retained in the colleges in both universities.

MANCO Capac, in *Biography*, legislator and first Inca among the Peruvians, was the twelfth in ascent from the Inca who reigned at the time of the Spanish invasion of Peru in 1532, which interval was computed by the natives at about 400 years. According to their tradition this personage, with his wife and sister Mama Ocollo, otherwise called Caya Mama, both of majestic form and clothed in decent garments, appeared in an island of the lake Titicaca, and declared themselves to be children of the sun, sent to civilize and instruct the savage people who then inhabited that country. Manco accordingly instructed the men in agriculture and other useful arts, while his wife taught the women to spin and weave. After this, Manco began to form them into a regular society, and to give them a system of laws and policy. Manco Capac, toward the close of a long and prosperous reign, assembled his numerous family and principal subjects in the city of Cuzco, and after a suitable exhortation he expired in their sight. His memory was held in the utmost veneration by his own people, and as far as we can rely upon the tradition annexed to his name, he seems justly entitled to rank among the benefactors of mankind. If what is supernatural be rejected from this tradition, it will appear that some stranger from a civilized land arrived in Peru, and, by calling in the aid of religion, obtained an ascendancy over the minds of the natives, which enabled him to form a regular government, and place himself at its head. Absolute power in the monarch was the necessary consequence of this sanctity of character, and the government took the form of a theocracy. Its civil institutions were directed to the preservation of order and tranquillity; its religious rites were for the most part innocent and humane; and gentleness and submission distinguished the Peruvians among the nations of South America. Robertson's Hist. of America.

MANCORA, in *Geography*, a town of Peru, in the diocese of Truxillo, on the road from Guayaquil to Truxillo, on the sea-coast; 70 miles N. of Payta.

MANCORON, a word used by the ancients to express what they call a sort of honey, which seems to have been evidently our modern *sugar*. They say that it was a sort of dry honey found concreted in canes or reeds, and was of the consistence of salt, and that it was found in India and Arabia Felix, and that when taken into the mouth, it broke under the teeth like salt.

MANCUNIUM, in *Ancient Geography*, a town of Britain mentioned in the 10th Iter or rout of Antonine's Itinerary, and supposed to be the same with *Manchester*; which see.

MANCUS, formed of *manu cusus*, in *Antiquity*, an Anglo-Saxon gold coin, equal in value to $2\frac{1}{2}$ solidi, or thirty pence; and in weight to fifty-five troy grains. The first account of this coin that occurs in the history of our country, is about the close of the eighth century, in an embassy of Cenwulf, king of Mercia, to Leo III. requesting the restoration of the jurisdiction of the see of Canterbury; this embassy was enforced by a present of 120 mancuses. Ethelwolf also sent yearly to Rome 300 mancuses: and these coins are said to have continued, in some form or other, till towards the conclusion of the Saxon government. The heriots of the nobility are chiefly estimated by this standard in Canute's laws. It came originally from Italy, where it was called ducat: and is supposed to have been the same with the drachma or miliarensis, current in the Byzantine empire. Clarke on Coins, p. 280, &c. See Mark.

MANDA, in *Geography*, an island in the straits of Malacca, near the coast of Sumatra, about 35 miles in circumference. N. lat. 0° 28′. E. long. 103 2′.

MANDACH, a village in the district of Wildenstein, in the Swiss canton of Aargau, on the left banks of the river Aar. The neighbourhood of this place is famous for the variety of petrifactions with which it abounds. The fields in its vicinity furnish numerous fragments of immense cornua ammonis, most of them several feet in diameter, likewise large quantities of petrified coralloids, such as milleporæ, porpytæ, trochitæ, terebratulitæ. Not far from Mandach, at Holwyl, elephants' tusks have been found, together with various species of cochlitæ, buccinitæ, turbinitæ, ostracitæ, echinitæ, &c. Still more of these fossil remains occur at Deutsch-

Deutsch-Beuren, among which is a vast stratum of gryphitæ, the prototypes of which do no longer exist; and, in a bed of sand, a thin stratum of the shell called concha hypocephaloides in its recent state, and hitherto not observed in any other place. Near Elfingen a stratum of small cochlitæ is seen, perfectly unmixed with other substances. In the neighbourhood of Veltheim we find belemnites, ammonites, tellinitæ, &c. in great profusion; and at Castelen and Schenkenberg, oolites, ostracitæ, chamitæ, &c.

All these petrifactions in the district of Wildenstein are deposited in the sand-stone formation, which overlays strata of lime-stone.

MANDADO, a small island in the East Indian sea, near the N. coast of Celebes. N. lat. 1° 18'. E. long. 124° 21'.

MANDAL, a sea-port town of Norway, in the province of Christiansand, at the mouth of a river of the same name; 19 miles W.S.W. of Christiansand. N. lat. 58° 2'. E. long. 7° 42'.

MANDALIG Islands, three or four small islands near the N. coast of Java. S. lat. 6° 27'. E. long. 110° 56'.

MANDAMUS, in *Law*, a writ issuing out of the court of king's bench, sent by the king, and directed to any person, corporation, or inferior court of judicature within the king's dominions; requiring them to do some particular thing therein specified, which pertains to their office and duty, and which the court of king's bench has previously determined, or, at least, supposes to be consonant to right and justice. This is a high prerogative writ, of a most extensive remedial nature; and may be issued in some cases, where the injured party has also a more tedious method of redress, as in the case of admission, or restitution to an office: but it issues in all cases where the party hath a right to have any thing done, and hath no other specific means of compelling its performance. A mandamus, therefore, lies to compel the admission or restoration of the party applying, to any office or franchise of a public nature, whether spiritual or temporal: to academical degrees; to the use of a meeting-house, &c. It lies for the production, inspection, or delivery of public books and papers; for the surrender of the regalia of a corporation; to oblige bodies corporate to affix their common seal; and to compel the holding of a court, &c. The writ of mandamus is made by statute (9 Ann. cap. 20.) a most full and effectual remedy for the refusal of admission, where a person is entitled to an office or place in any corporation, and also for wrongful removal, when a person is legally possessed. It may also be issued in pursuance of the statute, (11 Geo. I. cap. 4.) in case within the regular time no election shall be made of the mayor or other chief officer of any city, borough, or town corporate, or (being made) it shall afterwards become void; to require the electors to proceed to election, and proper courts to be held, for admitting and swearing in the magistrates so respectively chosen. This writ issues to the judges of any inferior court, commanding them to do justice according to the powers of their office, whenever the same is delayed. For it is the peculiar business of the court of king's bench to superintend all other inferior tribunals, and therein to inforce the due exercise of those judicial or ministerial powers, with which the crown or legislature has invested them; and this, not only by restraining their excesses, but by quickening their negligence, and obviating their denial of justice. A mandamus may, therefore, be had to the courts of the city of London, to enter up judgment (Raym. 214.); to the spiritual courts to grant an administration, to swear a churchwarden and the like. This writ is founded on a suggestion, by the oath of the party injured, of his own right, and the denial of justice below: whereupon, in order more fully to satisfy the court that there is a probable ground for such interposition, a rule is made (except in some general cases, where the probable ground is manifest), directing the party complained of to shew cause why a writ of mandamus should not issue; and if he shews no sufficient cause, the writ itself is issued, at first in the alternative, to do thus, or signify some reason to the contrary; to which a return or answer must be made, at a certain day. And if the inferior judge, or other person to whom the writ is directed, returns or signifies an insufficient reason, then there issues in the second place a peremptory mandamus, to do the thing absolutely; to which no other return will be admitted, but a certificate of perfect obedience and due execution of the writ. If the inferior judge or other person makes no return, or fails in his respect and obedience, he is punishable for his contempt by attachment. But if he, at the first, returns a sufficient cause, although it should be false in fact, the court of king's bench will not try the truth of the fact upon affidavits; but will for the present believe him, and proceed no farther on the mandamus. But then the party injured may have an action against him for his false return, and (if found false by the jury) shall recover damages equivalent to the injury sustained; together with a peremptory mandamus to the defendant to do his duty. Blackst. Com. book iii.

Mandamus was also a charge to the sheriff, to take into the king's hands all the lands and tenements of the king's widow, who, against her oath formerly given, married without the king's consent.

MANDANS, the name of those Indians who inhabit the vicinity of the Missouri in Louisiana. These Indians are brave, humane, and hospitable; and are, upon the whole, the most friendly and well-disposed in this part of the country. About thirty years ago they lived in six villages, about forty miles below their present villages, on both sides of the Missouri. Repeated visitations of the small-pox, together with frequent attacks of the Sioux, have reduced them to their present number. They claim no particular tract of country. They live in fortified villages, hunt in their own neighbourhood, and cultivate corn, beans, squashes, and tobacco, which form articles of traffic with their neighbours, the Assiniboins: they also barter horses with them for arms, ammunition, axes, kettles, and other articles of European manufacture, which the Assiniboins obtain from the British establishments on the Assiniboin river. The articles which they thus obtain from the Assiniboins, and the British traders who visit them, they again exchange for horses and leather tents with the Crow Indians, Chyennes, Watapahatoes, Kiawes, Kanenavich, Stactan, and Kataka, who visit them occasionally for the purpose of traffic. Their trade may be much increased. Their country is similar to that of the Ricaras: and their population is increasing. Jefferson.

MANDAR, a town of the island of Celebes; 125 miles N. of Macassar.

MANDARA, a town of Egypt, on the E. branch of the Nile; 38 miles N. of Cairo.

MANDAREE, a town of Bengal; 30 miles N.N.W. of Midnapour.

MANDARIN, a name given by the Portuguese to the nobility and magistracy of the eastern countries, especially to those of China.

The word mandarin is unknown in this sense among the Chinese, who, in lieu thereof, call their grandees and magiſtrates *quan*, or *quan fu*, q. d. ſervant or miniſter of a prince.

In China they have two claſſes of mandarins, thoſe of letters and thoſe of arms, who compoſe what is called the nobility. Theſe mandarins enjoy a very diſtinguiſhing privilege; in caſes of neceſſity, they may remonſtrate with the emperor, either individually, or as a body, upon any action or omiſſion on his part which may be contrary to the intereſts of the empire. Their remonſtrances are ſeldom ill-received by the ſovereign; but he reſerves to himſelf the right of paying to them that attention which he thinks they deſerve. Theſe mandarins are choſen from the *Literati* (which ſee), who are highly honoured in China. A mandarin of arms, however, is far from enjoying the ſame conſideration as a mandarin of letters; and hence it happens, that there is little emulation among the higher military ranks.

In order to obtain the degree of *mandarin of letters*, it is neceſſary to paſs through ſeveral other gradations: ſuch as that of bachelor (*ſie* or *tſai*), of licentiate (*kiu-gin*), and of doctor (*tſing ſsëe*). Sometimes by favour it is ſufficient to have attained to the two firſt degrees; but even thoſe on whom the third is conferred obtain at firſt only the government of a city of the ſecond or third claſs: and the manner of election is as follows: when ſeveral places happen to become vacant, the emperor invites to court a like number of literati, whoſe names are inſcribed in a liſt. The names of the vacant governments are put into a box, which is raiſed ſo high, that the candidates can only reach it with their hands. They then draw in their turns, and each is appointed governor of that city of which he has drawn the name.

There are eight orders of mandarins in China. The firſt is that of "Calao." Their number depends upon the will of the prince. Miniſters of ſtate, the preſidents of the ſupreme courts, and all the ſuperior officers of the militia, are choſen from this order, the chief of which is called "Cheou-ſiang." He is preſident of the emperor's council, and in him the emperor always repoſes great confidence. From the ſecond order of mandarins are ſelected the viceroys and preſidents of the ſupreme councils of the different provinces. Every mandarin of this rank is called "te-hioſe," *i. e.* a man of acknowledged ability. The title of "tchong-chueo," or ſchool of mandarins, is given to thoſe of the third order. One of their principal functions is that of ſecretary to the emperor. Certain employments are alſo aſſigned to each of the other claſſes. It is the buſineſs of mandarins of the fourth order, ſtyled "y-tchuen-tao," when no particular government is entruſted to them, or when they belong to no fixed tribunal, to keep in repair the harbours, royal lodging-houſes, and banks, of which the emperor is proprietor, in their diſtrict. The fifth order ("ping-pi-tao") have the inſpection of the troops. The ſixth ("tun-tien-pao") have the care of the highways. The ſeventh, or "ho-tao," have the ſuperintendance of the rivers; and the eighth, called "hai-tao," that of the ſea-coaſts. In a word, the whole adminiſtration of the Chineſe empire is entruſted to the mandarins of letters. From among them are choſen the governors of provinces, the governors of cities of the firſt, ſecond, and third claſs, and the preſidents and members of all the tribunals. Honours are laviſhed upon them, and every privilege and mark of diſtinction ſeem to be reſerved for them alone. The homage which the people pay to every mandarin in office is almoſt equal to that which is paid to the emperor himſelf. Among the Chineſe it is a received opinion, that their monarch is the father of the whole empire; that the governor of a province is the father of that province; and that the mandarin, who is governor of a city, is alſo the father of that city. The homage which the mandarins of letters receive is not diminiſhed by their great number. They amount to more than 14,000; and yet the veneration which the people entertain for them is always the ſame.

Public honours are more ſparingly beſtowed upon the *mandarins of arms*. They are never indulged with the ſmalleſt ſhare in the government of the ſtate; and yet, in order to be admitted to this rank, it is neceſſary, as well as for that of a mandarin of letters, to have paſſed through the three degrees of bachelor of arms, licentiate in arms, and doctor of arms. Strength of body, agility in performing the different military exerciſes, and a readineſs in comprehending and executing orders, are all the previous qualifications required in mandarins of arms; and in theſe conſiſt the various examinations which candidates are obliged to undergo before they can be admitted to that rank. Candidates for the two firſt degrees are always examined in the capital city of the province. The mandarins of arms have tribunals, the members of which are ſelected from among their chiefs. Among theſe they reckon princes, dukes, and counts, all which dignities, or other equivalent to them, are found in China. The principal of theſe tribunals is fixed at Peking, and it is compoſed of five different claſſes, *viz.* that of the mandarins of the rear-guard, named "Heou-fou," that of the mandarins of the left wing, called "Tſa-fou," that of the mandarins of the right wing, ſtyled "Yeou-feou," that compoſed of the mandarins of the advanced main-guard, known by the name of "Tchong-fou," and that conſiſting of the mandarins of the advanced guard, called "Tſien-fou." Theſe five tribunals are ſubordinate to a ſupreme tribunal of war, called "Iong-tching-fou," which is alſo eſtabliſhed at Peking. The preſident of this tribunal is one of the great lords of the empire, whoſe authority extends over all the officers and ſoldiers of the army. This preſident has for his aſſeſſor a mandarin of letters, who enjoys the title, and exerciſes the function of ſuperintendant of arms. He is required to take the advice of two inſpectors, who are named by the emperor; and when theſe four perſons have agreed upon any meaſure, their reſolution muſt ſtill be ſubmitted to the reviſion of a fourth ſupreme court, called "Ping-pou," which is entirely of a civil nature. The chief of the mandarins of arms is a general by birth; his power in the field is equivalent to that of our commander-in-chief. Under him there is a certain number of mandarins, who act as lieutenant-generals; other mandarins diſcharge the duty of colonels, captains, lieutenants, and enſigns. It is computed that there are in China between eighteen and twenty thouſand mandarins of war; in this reſpect they are ſuperior to the mandarins of letters; but the importance of the latter makes them to be conſidered the firſt and principal body in the empire. Thus, literature is encouraged, but military ardour is checked. The weakneſs of the mandarins of arms occaſioned the conqueſt of China by the Tartars; and they have made no alteration ſince in theſe two branches of the Chineſe conſtitution.

The viceroy of a province, diſtinguiſhed by the title of "Tſong-tou," is always a mandarin of the firſt claſs, and his power in his diſtrict is almoſt unlimited. He never quits his palace without a guard of 100 men. He is the receiver-general of all the taxes collected in his province, and by him they are tranſmitted to the capital. All law-ſuits are brought to his tribunal, and he has the power of condemning criminals to death; ſubject, however, in the exerciſe of it, to the approbation or confirmation of the emperor. The viceroy, every three years, tranſmits to court an account of the conduct of ſubordinate mandarins; and ſuch is his influence, that they are accordingly continued in office or difgraced. The conduct of the viceroy himfelf is watched by infpectors, whofe authority is formidable to him; and more efpecially to inferior mandarins, whom he has power to deprive of their employments for mifbehaviour. In order to prevent partiality among the mandarins, relations in the fourth degree cannot have a feat at the fame time in any of the provincial tribunals. Sick or fuperannuated mandarins are liberally provided for by government. All mandarins, whether Tartars or Chinefe, of arms or of letters, are obliged, every three years, to give in writing an exact account of the faults they have committed in difcharging the duties of their office; and this kind of confeffion is examined at court, if the mandarin belong to any of the four firft claffes: but if it be made by any mandarins of the lower claffes, it muft be laid before the provincial tribunal of the governor. Informations, as the refult of private inquiry, are addreffed to the tribunal of mandarins, and there carefully examined: and diftributive juftice is exercifed accordingly. Every mandarin who has difcharged his duty with ability, zeal, and fidelity, is rewarded; but if he has been guilty of oppreffion and malpractices, he is not only difmiffed, but impeached, and tried before the tribunal of crimes.

Since the time that the Tartars have rendered themfelves mafters of China, moft of the tribunals, or courts of juftice, &c. inftead of one mandarin for a prefident, have two, the one a Tartar, and the other a Chinefe.

The mandarinate is not hereditary. Duhalde. Grofier.

Mandarin is alfo a name which the Chinefe give to the learned language of the country

Befides the proper and peculiar language of each nation and province, they have one common to all the learned men in the empire. This they call the mandarin tongue, or the language of the court. Their public officers, as notaries, lawyers, judges, and chief magiftrates, write and fpeak the mandarin.

MANDATA, in *Geography*, a town on the S.W. coaft of Sumatra; 45 miles S.E. of Indrapour.

MANDATARY, Mandatarius, he to whom a command or charge is given: and he that comes to a benefice by a mandamus is called by this name.

MANDATE, Mandatum, in the *Canon Law*, denotes a refcript of the pope, by which he commands fome ordinary, collator, or prefenter, to put the perfon there nominated in poffeffion of the firft benefice vacant in his collation.

An apoftolical mandate for the provifion of benefices, is a monitorial and comminatory letter from the pope to a bifhop, by which he is enjoined to provide a fubfiftence for thofe who have been ordained by him, or his predeceffors, from the tonfure to facred orders inclufively; and to allow them their fubfiftence till they be provided with a benefice. This practice was occafioned by the bifhops formerly laying hands on great numbers, and afterwards abandoning them to mifery and want.

At firft the popes only gave monitory mandates, which were no more than fimple prayers and requefts, that did not bind the ordinary; afterwards they gave preceptory mandates, which did not annul the provifions of the ordinary; at laft they fet up executory mandates, by which the provifions made by the ordinary, in prejudice of the mandate, were declared null; and the executor of the mandate, in default of the ordinary, conferred the benefice on the mandatory: but the pope's power in iffuing thefe mandates is now very much reftrained, and almoft totally annulled.

Mandates, *Royal*, to judges for interfering in private caufes, conftituted a branch of the royal prerogative, which was given up by our Englifh Juftinian, Edward I.; and alfo by 2 Edw. III. c. 8, and 11 Ric. II. c. 10, it is enacted, that no commands or letters fhall be fent under the great feal, or the little feal, the fignet, or privy feal, in difturbance of the law; or to difturb or delay common right; and, though fuch commandments fhould come, the judges fhall not ceafe to do right; which is alfo made a part of their oath by ftatute 18 Edw. III. ft. 4; and by 1 W. & M. ft. 2. c. 2, it is declared, that the pretended power of fufpending, or difpenfing with laws, or the execution of laws, by regal authority, without confent of parliament, is illegal.

MANDATTA, in *Geography*, a town of Hindooftan, in Candeifh; 30 miles S.S.E. of Indore.

MANDAVEE, a town of Hindooftan, in Guzerat; 25 miles E. of Surat.—Alfo, a town of Hindooftan, in Baglana; 12 miles N.N.E. of Baffeen.

MANDAWEE, a town on the S. coaft of the ifland of Borneo. S. lat. 3° 20'. E. long. 113° 30'.

Mandawee *Iflands*, a clufter of fmall iflands in the Eaft Indian fea, near the S. coaft of Borneo. S. lat. 3° 20'. E. long. 113° 30'.

MANDAYA, a town on the W. coaft of the ifland of Celebes. S. lat. 2° 33'. E. long. 119° 9'.

MANDE', St., a fmall ifland in the Englifh channel, near the coaft of France. N. lat. 48° 51'. W. long. 2° 59'.

MANDEGELE, a town of the ifland of Ceylon, near the E. coaft; 88 miles E.S.E. of Candy.

MANDELGUR, a town of Hindooftan, in the circar of Meywar; 14 miles N. of Cheetore.

MANDELLI, a town of Abyffinia; 150 miles E. of Gondar.

MANDELSLO, John-Albert, in *Biography*, a native of Mecklenburg, was page to the duke of Holftein, and accompanied, as gentleman of the chamber, the embaffadors whom that duke fent to Mufcovy and Perfia in 1636. From the court of Perfia, he went to Ormuz, and embarked for the Indies. On his return he drew up a "Journal of his Voyages," which is printed in the fecond volume of the Travels of Olearius, who was fecretary to the embaffy, and is held in much efteem. Moreri.

MANDELSTEIN, in *Mineralogy*. See Trap.

MANDERA, in *Geography*, a town of Africa; 120 miles N.E. of Sennaar. N. lat. 14° 45'. E. long. 35° 10'.

MANDERSCHEID, a town of France, in the department of the Sarre, and chief place of a canton, in the diftrict of Prum; 21 miles N.N.E. of Treves. The place contains 323, and the canton 2595 inhabitants, in 24 communes.

MANDERY, a town of Hindooftan, in Dowlatabad; 10 miles W.N.W. of Ranapour.

MANDEVILLE, *Sir* John, in *Biography*, a celebrated early traveller, was born at St. Albans about the beginning of the fourteenth century. He was intended for the profeffion of phyfic, which he probably practifed, but an ardent defire of vifiting foreign countries induced him, in 1332, to fet out upon a courfe of travels, in which he fpent more than thirty years. During this period he extended his peregrinations through the greateft part of Afia, Egypt, and Lybia, making himfelf mafter of many languages, and collected a great mafs of information, which he committed to writing in Latin, Englifh, and French. He died at Liege in the year 1372. The only genuine edition of his travels is thus entitled, "The Voiage and Travaile of fir John Mandeville, knight:" it was printed from the original MS. in the Cottonian library, 1727. The character of fir John, for veracity, has been very differently regarded by different and competent judges; his narratives were highly efteemed in his own age, and they rendered him celebrated throughout Europe,

Europe. By fome of his remarks it fhould feem that he had a general acquaintance with the fcience of the period in which he flourifhed.

MANDEWAR, in *Geography*, a town of Hindooftan, in Bahar; 32 miles S.S.W. of Arrah.

MANDIBLE, the *Jaw*, in *Anatomy*. See MAXILLA and CRANIUM.

MANDIBULARES, or MANDUCATORII *Mufculi*. See MASSETER and DEGLUTITION.

MANDIL, or MANDRIL, the name of a kind of cap or turban worn by the Perfians.

The mandil is formed by firft wrapping round the head a piece of fine white linen five or fix ells long; over this they wrap, in the fame manner, a piece of filk of the fame length, and often times of great value. To make the mandil genteel, care muft be taken, that, in wrapping the filk, it be fo managed, as that the feveral colours found in the feveral folds make a kind of waves, fomewhat like what we fee on marbled paper.

The drefs is extremely majeftic, but at the fame time very heavy: it ferves either as a fhelter to the head from cold, or as a fcreen from the exceffive heat of the fun; it is faid, that a blow of a cutlafs will not penetrate it. In rainy weather they cover it with a kind of cafe or hood, made of red cloth.

The mode of the mandril has been for fome time altered: during the time of Schah-Abbas II. it was round at top; in the time of Schah-Soliman, they brought one end of the filk out of the middle of the mandril over the head; and, laftly, in the reign of Schah-Huffein, the end of the filk, in lieu of its being gathered as before, was plaited in manner of a rofe; and this the Perfians account extremely graceful, and ufe it to this day.

MANDING, or MANDINGA, in *Geography*, a country of Africa, fituated on both fides of the river Joliba or Niger, towards its fources, and fupplying thofe ftreams or rivers, called Bafing and Kokoro, that form the Senegal. This country comprehends a confiderable tract from between 11° and 13° N. lat. and between about 5° and 7° W. long. The inhabitants of this country, and thofe of other diftricts in the weftern part of Africa, who have probably migrated from hence, are called Mandingoes, and their language has a confiderable extent. The government of this country is faid to be republican, though that of the other African ftates is, in general, monarchical. In their complexions and perfons, the Mandingoes are eafily diftinguifhed from thofe Africans who are born nearer to the equator; and yet they confift of very diftinct tribes, fome of which are remarkably tall and black; and there is one tribe among them (called alfo the Phulies) that feemed to Mr. Edwards to conftitute the link between the Moors and Negroes, properly fo called. They are of a lefs gloffy black than the Gold Coaft negroes; and their hair, though bufhy and crifped, is not woolly, but foft and filky to the touch. Neither have the Mandingoes, in common, the thick lips and flat nofes of the more fouthern natives; and they are, in a great degree, exempt from that ftrong and fetid odour which exhales from the fkin of moft of the latter; but in general they are not well adapted for hard labour. After all, they differ lefs in their perfons, than in the qualities of the mind, from the natives of the Gold Coaft; who may be faid to conftitute the genuine and original unmixed negro, both in perfon and character. See KOROMANTYN *Negroes*.

The Mandingoes, in general, are of a mild, fociable, and obliging difpofition; the men are commonly above the middle fize; and the women are fprightly, good-humoured, and agreeable. The drefs of both fexes confifts of cotton cloth, of their own manufacture; that of the men is a loofe frock, not unlike a furplice, with drawers which reach half-way down the leg, and they wear fandals on their feet, and white cotton caps on their heads. The women's drefs confifts of two pieces of cloth, each of which is about fix feet long and three broad; one of which they wrap round the waift, which, hanging down to the ancles, ferves for a petticoat, and the other is thrown negligently over the bofom and fhoulders. In the conftruction of their houfes, the Mandingoes, like the other Africans, in this part of the continent, content themfelves with fmall hovels. A circular mud-wall, about four feet high, upon which is placed a conical roof compofed of the bamboo cane, and thatched with grafs, forms their common dwelling for people of all ranks. Their houfhold furniture is no lefs fimple; a hurdle of canes placed upon upright ftakes, about two feet from the ground, upon which is fpread a mat, or bullock's hide, anfwers the purpofe of a bed; a water jar, fome earthen pots for dreffing their food, a few wooden bowls and calabafhes, and one or two low ftools, are their other domeftic articles. As every man of free condition has a plurality of wives, it becomes neceffary, for the prevention of difputes, to accommodate each lady with a hut to herfelf; and all the huts belonging to the fame family are furrounded by a fence conftructed of bamboo canes, fplit and formed into a fort of wicker work. The whole inclofure is denominated a "firk," or "furk." A number of thefe inclofures, feparated by narrow paffages, conftitute what is called a town; in which the houfes are placed without any order, except that the door is fituated towards the fouth-weft, in order to admit the fea-breeze. Their religion is, as we may conceive, blended with many fuperftitious opinions and practices. Although they admit the exiftence of a deity, as the maker and preferver of all things, they confider him as too remote and too exalted in his nature to regard the fupplications of wretched mortals, or to alter for their fake any of his purpofes and decrees. The prayers which are offered up at the appearance of the new moon are performed merely in conformity to a cuftom which has been tranfmitted to them from their anceftors. Subordinate fpirits, as they imagine, are entrufted by the almighty with the fuperintendence and direction of all human concerns; and thefe fpirits are much under the influence of certain magical ceremonies. The rite of circumcifion prevails in this part of Africa even by thofe negroes, who have never received the religion of Mahomet. The Jaloffs confine it to the males; but the Mandingoes, both Soninkees and Bufhreens, extend the ceremony to both fexes, as the ancient Egyptians did before them; and the operation is performed at the commencement of puberty. Mr. Park, in his "Travels," informs us, that the negroes, in general, did not feem to confider this painful rite as an act of religious duty, and as fuch, effential to their future falvation; but rather as an operation of phyfical neceffity; without which the marriage ftate could not, in their opinion, be prolific. (See CIRCUMCISION.) We learn alfo from this obferving and intelligent traveller, that the negroes of this part of Africa firmly believe in a life beyond the grave, and a ftate of retribution after death, in which good men will be rewarded, and bad men punifhed. He converfed with the natives of all defcriptions on this important fubject, and pronounces, without the fmalleft hefitation, that a conviction of this great truth among the negroes is entire, hereditary, and univerfal.

Among the Mandingoes there are few or no inftances of longevity: at 40, moft of them become grey-haired and wrinkled; and few furvive the age of 50 or 60, counting their years by the number of rainy feafons, one of which only occurs in the year. Their difeafes, however, are few; the

the principal being the dyſentery, the yaws, the elephantiaſis, and a leproſy of the worſt kind. The Guinea worm is alſo in ſome places very common, eſpecially at the commencement of the rainy ſeaſon, and this they attribute to bad water; to which they likewiſe aſcribe the goitres, or ſwellings of the neck, which are very common in ſome parts of Bambarra.

The principal of their muſical inſtruments are the koonting, a ſort of guitar with three ſtrings; the korro, a large harp with eighteen ſtrings; the ſimbing, a ſmall harp with ſeven ſtrings; the balafon, compoſed of twenty pieces of hard wood of different lengths, with the ſhells of gourds hung under them, for increaſing the ſound; the tangtang, a drum open at the lower end; and the tabala, a large drum uſed for cauſing an alarm through the country. Beſides theſe, they make uſe of ſmall flutes, bow-ſtrings, elephants' teeth, and bells; and at all their dances and concerts, clapping of hands conſtitutes a neceſſary part of the chorus.

The beverage of the pagan Negroes is beer and mead, in the uſe of which they are apt to indulge to exceſs. The Mahometan converts drink nothing but water. The natives of all deſcriptions take ſnuff, and ſmoke tobacco; and their pipes are made of wood, with an earthen bowl of curious workmanſhip. But in the interior diſtricts, the greateſt of all luxuries is ſalt. The arts of weaving, dyeing, ſewing, &c. are univerſally practiſed; but the only artiſts, acknowledged as ſuch by the Negroes, are the manufacturers of leather and iron. They tan and dreſs leather very expeditiouſly, by firſt ſteeping the hide in a mixture of wood-aſhes and water, until it parts with the hair; and afterwards uſing the pounded leaves of a tree called goo, as an aſtringent. Moſt of the African blackſmiths are acquainted with the method of ſmelting gold; in which proceſs they uſe an alkaline ſalt, obtained from a ley of burnt corn-ſtalks, evaporated to dryneſs. They likewiſe draw gold into wire, and form it into a variety of ornaments, with great ingenuity and taſte. Gold is found in every part of Mandingo, in ſmall grains, nearly in a pure ſtate, from the ſize of a pin's head to that of a pea.

The Mandingoes, moſt of whom are proſelyted to Mahometaniſm, have frequent wars with each other, as well as with thoſe nations regarded by them as enemies of their faith. The advantage poſſeſſed by a few of theſe people, of being able to read and write, is a circumſtance on which the Mandingo Negroes in the Weſt Indies pride themſelves greatly among the reſt of the ſlaves, over whom they conſider themſelves as poſſeſſing a decided ſuperiority; and in truth, ſays Mr. B. Edwards, they diſplay ſuch gentleneſs of diſpoſition and demeanour, as would ſeem to be the reſult of early education and diſcipline, were it not that, generally ſpeaking, they are more prone to theft than any of the African tribes. It has been ſuppoſed that this propenſity, among other vices, is natural to a ſtate of ſlavery, which degrades and corrupts the human mind in a deplorable manner; but why the Mandingoes ſhould have become more vicious in this reſpect than the reſt of the natives of Africa, in the ſame condition of life, is a queſtion not eaſily reſolved. Edwards's Hiſt. of the Weſt Indies, vol. ii.

MANDIOLY, an iſland in the Eaſt Indian ſea, of a ſemicircular form, about 120 miles in circumference, ſeparated from the weſt coaſt of Gilolo by the ſtraits of Patientia, and belonging to the ſultan of Bachian. The iſland is centrally traverſed by the equator. E. long. 124°.

MANDOE, a ſmall iſland in the German ocean, near the coaſt of Sleſwick; 10 miles W.S.W. of Ripen. N. lat. 55° 10'. E. long. 8° 32'.

MANDOLA, a town of Italy, in the marquiſate of Ancona; 30 miles N.E. of Spoleto.

Mandola, and *Mandora*, Ital.; *Teſtudo minor*, Lat.; *Mandole*, and *Mandoline*, Fr.; a very ſmall inſtrument, in form of a violin, with four ſtrings, and a fretted neck, played with a quill in the right hand inſtead of a bow. About thirty years ago there was a Neapolitan here, of the name of Franceſe, who played admirably on this diminutive tinkling inſtrument, which had very little tone or variety of expreſſion; yet, by his taſte, fancy, and enthuſiaſm, Franceſe entertained lovers and nice judges of muſic during ſeveral hours, without tiring them with its monotony, or rather total want of tone.

MANDORE, a ſmall lute or guitar, with four ſtrings, tuned fourths and fifths, ſometimes thrummed with the finger, and ſometimes played with a quill, like the mandoline.

MANDRA, in *Geography*, a town of Ruſſia, in the government of Irkutſk; 76 miles N.E. of Kirenſk.

MANDRAGORA, in *Botany*. See Atropa and Dudaim.

Mandragora, *Chineſe*, is the plant *Ginſeng*; which ſee.

MANDRAKE. See Atropa and Dudaim.

The roots of mandrake vary both in form and colour, being either divided or entire, and externally brown or black: hence they have been diſtinguiſhed into male and female. The internal ſubſtance is white, and to the taſte ſomewhat viſcid, bitter, and nauſeous.

Mandrake, in the *Materia Medica*, has been recommended in caſe of barrenneſs, but without foundation. All the eminent writers on mandrake repreſent the root to be an anodyne and ſoporific; but in large doſes it is ſaid to excite maniacal fury. They employed it principally in continued watchings, and in thoſe more painful and obſtinate affections which were found to reſiſt leſs powerful medicines. It was alſo uſed in melancholia, convulſions, rheumatic pains, ſcrophulous tumours, &c.: and for theſe purpoſes, either the expreſſed juice of the cortical part of the root, inſpiſſated, or a vinous decoction or infuſion of the root, was directed. Pallas alſo mentions it as of frequent uſe for chronic diſeaſes in ſome parts of Ruſſia. (See Atropa *Mandragora*.) The experiments, recited under that article, ſhew that the mandrake acts as an opiate; which confirms the opinion entertained by the ancients: and hence it may be concluded, that if it be not adminiſtered with great care, it may prove a deleterious and mental narcotic. This caution is the more neceſſary, as the berries of mandrake are ſaid to have been eaten without producing any bad effect. Woodville.

Mandrake-*Wine*, *Mandragorites Vinum*, a ſort of medicinal impregnation of wine with the virtues of mandrake root. It is prepared by cutting into thin ſlices half a pound of the bark of mandrake roots, and ſtringing them on a thread, and letting them down into a veſſel containing nine gallons of white wine, ſo that they may hang looſely in it, and by that means fully impregnate it with their virtues. It was uſed in ſmall doſes as an anodyne and ſoporific. It had the ſame effects alſo, if only ſmelled to, and was ſometimes injected in clyſters to the ſame purpoſe. They ſay that half a pint of this liquor, mixed with twelve times its quantity of wine, brings on a carus; and that even a ſmaller doſe than this, leſs diluted, is mortal. See the preceding article, and Atropa *Mandragora*.

MANDREL, a kind of wooden pulley, making a member of the turner's lathe.

Of thefe there are feveral kinds; as,

Mandrels, *Flat*, which have three or more little pegs or points near the verge, and are ufeful for turning flat boards on.

Mandrels, *Pin*, which have a long wooden fhank to fit into a round hole made in the work to be turned.

Mandrels, *Hollow*, which are hollow of themfelves, and ufed for turning hollow work.

Mandrels, *Screw*, for turning fcrews, &c.

MANDRIL, in *Zoology*, a fpecies of baboon, or monkey. See Simia *Maimon*.

MANDSHURES, in *Geography*, people of Siberia who form two nations, the one called Mandfhu or Mandfhures, and the other Tungufes. Both thefe nations are related by defcent, as we may conclude from their traditions, their language, and their bodily ftructure. The whole fwarm together poffeffes extenfive countries and deferts in eaftern Siberia, and in the northern Mongolia. The Mandfhu are ftill very powerful; one of their princely families being in hereditary poffeffion of the throne of China. Before the Ruffians entered Siberia, the Mandfhures were in poffeffion of all Daouria, or the eaftern Siberia, from the Baikal quite to the Mongolian mountains, together with the regions adjacent to the Amoor, and its collateral rivers. They were at that time divided into feveral ftems, of which the Daourians inhabited the parts about the Selenga and the Upper Amoor; the Dutfchares dwelt between the Argoon and the Schilka; the Atfchares about the middle Amoor; and the Ghiliaks at the mouth of the Amoor, on the coafts of the Eaftern ocean.

The Daourian Mandfhu, not waiting for the arrival of the Ruffians in their territories, retreated to the Amoor, and into the empire of China. At the firft Ruffian expedition, about the middle of the feventeenth century, the Daourians and Dutfchares were fubjects of the Chinefe emperor, who, as a native Mandfhu, aided their flight, and afforded them protection. The Ghiliaks and Atfchares fubfifted then in a ftate of independence, and accepted the Ruffian patronage without oppofition. Their example was followed by confiderable multitudes of the other two ftems; but moft of them, by orders of the Chinefe government, were tranfported from the Amoor, of which the Ruffians had made themfelves mafters, farther towards China. Afterwards, at a peace concluded at Nertfchinfk, the whole of the Amoor, with all the Mandfhures belonging to Ruffia, was ceded to China; and at prefent, the mountain-ridge Stannovoi Khrebet, which ftretches from Daouria northeaftward between the rivers Lena and Amoor to the Eaftern ocean, forms the boundary betwixt the two empires. In the frontier mountains themfelves, however, are no Mandfhures, but Tungufes, who are partly tributary to the Chinefe, partly to Ruffia, or live in complete independence.

The Mandfhu, particularly the Daourian, while they inhabited the modern Ruffia, were by no means an uncivilized people. According to their written accounts and traditions, they had a conftitution compofed of nomadic and civil parts, and adapted to their fituation, their mode of life, &c. They lived peaceably among themfelves and with their neighbours, attending fedulonfly to agriculture, grazing, and even to mining. Traces are ftill feen about the Bargufin, and other rivers, of their gardens, orchards, and fields, artfully laid out, and watered with artificial water-courfes. The Daourian mine-works on the banks of the Argoon, ftill famous under the name of the Nertfchinkian mines, as well as all Daouria, afford numerous proofs of the mineral labours of the ancient Daourians. Tooke's Ruff. Emp. vol. i. See Tunguses.

The country of the Mandfhures is divided by the Chinefe into three great governments. 1. That of Chin-yang or *Chen-yang*; which fee. 2. The government of Kiren-Oula. (See Kirin.) 3. The government of *Tfitchicar*; which fee. See *Mantcheew* Tartars.

MANDSJADE, in *Botany*, is an Indian filiquous or pod-bearing tree, with a fpiked pentapetalous flower, and long pods containing nodous fcarlet-coloured beans; the tree is one of the talleft in the kingdom of Malabar, bears fruit the twentieth year after planting, and living near two hundred years.

The wood is of common ufe for various purpofes, on account of its folidity; the leaves, reduced to powder, are ufed in the pagan religious rites; the feeds, which are not ungrateful to the tafte, are eaten by the common people, either boiled whole or ground to a meal; and are, befides, of great ufe to goldfmiths and jewellers, who, on account of their exact equality, employ them inftead of grains in weighing their wares; for each maljelina, as they call them, weighs four grains, fuch as are in ufe among the goldfmiths; who, alfo of the bruifed feeds, moiftened with water and borax, prepare a glue for conglutinating the finer fort of veffels, when broken. Of the bruifed leaves the phyficians prepare a potion for mitigating pains in the loins.

MANDU, in *Geography*, a town of Hindooftan, in Myfore; 10 miles N.E. of Seringapatam.

MANDUCATION, the action of *chewing*, otherwife called *maftication*.

Manducation is a term feldom ufed but in fpeaking of the eucharift. The Catholics maintain a real manducation of the body of Chrift; the reformed, on the contrary, take this manducation to be only figurative, and by faith. St. Auguftine calls it *fpiritual manducation*.

MANDUN, in *Geography*, a town of Hindooftan, in Guzerat; 30 miles S.E. of Janegur.

MANDURIA, an ancient town of Naples, in Calabria Citra. After having funk into decay, it was rebuilt at a little diftance from its former feite, and called "Cafale Nuovo," which name it retained till the year 1790, when, at the requeft of the inhabitants, the original name was reftored. It contained about 4000 inhabitants. In 1783 it fuffered very much by an earthquake.

MANE', a fea-port on the W. coaft of Madagafcar, at the mouth of the river Manfiatre. S. lat. 33° 35'.

Mane *of a Horfe*, in the *Manege*. (See Horse.) The adjuftment of the manes of horfes was an object of particular attention among the Armenians, and others who valued themfelves on their breed of thefe animals. Some, as we learn from Vegetius, ufed to cut them clear off, a practice which he condemns, becaufe it rendered the horfe unfightly and deformed. Others clipped them, fo as to make them refemble an arch or bow, called by us an "hog's mane." Others again feparated the mane into notches, like the battlements of a tower; while fome cut it clofe, but only on one fide, leaving the hair long and flowing on the other, which was very graceful and becoming: the fide on which the mane was turned and repofed being always to the right. To this Virgil alludes, when he directs the mane to be laid on the right fhoulder.

"Denfa juba, et dextro jactata recumbit in armo."

This method was practifed by the Perfians as well as the Armenians; and appears, by the above citation, to have been

been in uſe with the Romans, as well as that of ſhearing the manes of their "manni" or nags; whence Propertius ſays, his miſtreſs Cynthia was carried in her litter by ſhorn horſes.

"Et mea detonſis advecta eſt Cynthia mannis."

Varro likewiſe directs the mane to be turned to the right ſide. They alſo tied it in knots, or plaited it, as the word "implicata" (lib. iv. c. 7.) aptly expreſſes. No particular reaſon is aſſigned for always turning the mane on the right ſide: it might be owing, perhaps, to the cuſtom of mounting on the right, which was frequently, but not always, the practice; and in that caſe, the mane hanging on the ſide, from which the horſeman got up, offered itſelf to his hand to aſſiſt him in the action; while we, without any meaning, always mount on the left, and always turn the mane to the right. The Armenians, as well as the Parthians, had another method of trimming their horſes, by which they made them as it were "double maned;" for the hair being cut away in the middle, the mane was divided, and falling down, clothed each ſide of the neck; a faſhion ſometimes uſed at preſent, but generally among coach horſes. Berenger's Hiſt. &c. of Horſemanſhip, vol. i.

Mane-*ſheet*, is a ſort of covering for the upper part of a horſe's head, and all round his neck, which at one end has two holes for the ears to paſs through, and then joins to the halter upon the fore-part of the head, and likewiſe to the ſurcingle, or long girth, upon the horſe's back.

MAN-EATER's Island, in *Geography*, a ſmall iſland in the Indian ſea, near the N. coaſt of the iſland of Java, between Batavia and Bantam.

MANEBELLO, a ſmall iſland in the Eaſt Indian ſea. S. lat. 4° 9'. E. long. 131° 58'.

MANEGE. A horſe is ſaid to manege when he works upon volts and airs, which ſuppoſes him broke and bred. See Manage.

Manege *for a Soldier's Horſe*, is a gallop of unequal ſwiftneſs, but ſo that the horſe changes hands readily.

Manege, *High*, is the high or raiſed airs, which are proper for leaping horſes. See Airs.

MANEGED. A horſe is ſaid to be thoroughly maneged, or a finiſhed horſe, that is well broken, bred, and confirmed in a particular air or manege, ſo as to bear well upon the hand, know the heels, and ſit well upon the hips.

MANELLI, Francesco, of Tivoli, in *Biography*, compoſer of the firſt Italian opera that was performed on a public ſtage in Venice, in 1635. The drama, intitled "Temiſtocle," was written by Ferrari, himſelf a compoſer; but the preference given to Manelli, either by the author of the words, or by the public, at ſuch an era, is an indiſputable proof of reſpect for his abilities; and a ſtill leſs ſuſpicious compliment to his talents, was his being retained by the ſame poet, and the ſame public, to compoſe a ſecond opera, "Andromeda," in 1637. In ſubſequent years he compoſed four more operas, which had great ſucceſs. See Opera and Venice.

MANEQUIN, among *Painters*. See Layman.

MANERBIO, in *Geography*, a town of Italy, in the department of the Mela; 12 miles S. of Breſcia.

MANES, or Mani, in *Biography*. See Manichees.

Manes, a poetical term, ſignifying the ſhades or ſouls of the deceaſed.

The heathens uſed a variety of ceremonies and ſacrifices to appeaſe the manes of thoſe who were deprived of burial. See Lemures and Lemuria.

Manes, *Dii*, were the ſame with *inferi*, or the infernal gods, who tormented men; and to theſe the heathens offered ſacrifices, to aſſuage their indignation.

The heathen theology is a little obſcure with regard to theſe gods, manes. Some hold, that they were the ſouls of the dead; others that they were the genii of men; which laſt opinion ſuits beſt with the etymology of the word, and ſuch is their origin according to Heſiod.

The heathens, it is pretty evident, uſed the word manes in ſeveral ſenſes; ſo that it ſometimes ſignified the ghoſts of the departed, and ſometimes the infernal or ſubterraneous deities, and in general all divinities that preſided over tombs, and the ghoſts that were thought to wander about theſe tombs. Accordingly, their true original may be referred to a prevailing opinion, that the world was full of genii, ſome of whom attended on the living, and others on the dead: that ſome were good and others bad, and that the former were called "familiar lares," and the latter lemures or larvæ. Thus, when Virgil ſays, "Quiſque ſuos patimur manes," it is, according to Servius, as if he had ſaid, "we have each of us our genius." Apuleius, in his explication of the *Lemures* and *Larvæ* (ſee both theſe articles), ſays that the lares and larvæ are denominated "Dii Manes," and that the deſignation of gods is added to them by way of honour. Agreeably to this opinion it is no wonder that the ancients ſhould confound the manes with the lares and the lemures.

The evocation of the manes of the dead ſeems to have been very frequent among the Theſſalians; but it was expreſsly prohibited by the Romans. See Lares.

MANESSON-MALLET, Alan, in *Biography*, a native of Paris, who flouriſhed in the 17th century, and who was diſtinguiſhed in the ſervice of the king of Portugal as a military engineer. He is known, however, chiefly by his works, which continue ſtill to be in requeſt: they are "Martial Studies, or the Art of War," 1691, in three vols: "A Deſcription of the Univerſe," &c. 1683, in five vols: "Practical Geometry," 1702, in four vols. 8vo. His works are all illuſtrated with plans, maps, and other engravings.

MANETHOS, an ancient Egyptian hiſtorian, called the Sebennite, from the place of his origin, was high-prieſt of Heliopolis in the reign of Ptolemy Philadelphus, about the year 304 B.C. He wrote in the Greek language a hiſtory of Egypt, the ſubject matter of which he aſſerts to have been extracted from certain pillars in the Siriadic land, on which inſcriptions had been made in the ſacred dialect of Thoth, the firſt Mercury, which after the flood were tranſlated into the Greek tongue, but were written in the ſacred character, and were laid up in books in the ſacred receſſes of Egypt by the ſecond Mercury. But this account, which certainly related to the earlier portions of the hiſtory, is ſo incredible, by its reference to the Greek language, at a period when it could not be known in Egypt, that the writers of the Univerſal Hiſtory ſuſpect ſome miſtake or corruption in the paſſage of Euſebius containing it. The work of Manethos was divided into three tomes, the firſt of which comprehended the hiſtory of the gods and demi-gods, who in his eſtimation were mortal men very eminent for virtue; the ſecond that of the eight dynaſties of kings, and the third of twelve. The hiſtory, which is, in a good meaſure, fabulous, is loſt, but his dynaſties have been preſerved in the chronicle of Euſebius. Some fragments of the hiſtory are to be found in Joſephus's work againſt Apion.

MANETTI, Gianozzo, was born at Florence in 1396: he was intended for trade, and received an education ſuitable to it, but being put into the houſe of a banker when he was only ten years of age, he became diſguſted with the employment,

employment, and was accordingly permitted to apply his mind to the various kinds of literature that were then cultivated. During nine years he devoted himfelf to thefe purfuits, after which he was appointed by the Florentines to give public lectures on the ethics of Ariftotle, which were attended by a vaft number of pupils. From the age of thirty-five, he was employed by the ftate in various honourable offices, and was feveral times deputed to prefide over the public ftudies, which always flourifhed under his fuperintendance. He was fent on embaffies to the republic of Genoa; to king Alphonfo; to Francis Sforza; to the popes Eugenius IV. and Nicholas V.; to feveral of the Italian ftates, and to the emperor Frederic III., and on all thefe occafions he gave proof of great prudence and dexterity in the management of affairs, and of an eloquence which was the object of univerfal admiration. Notwithftanding the high rank to which he had attained, he found caufe for diffatisfaction at his own court, and retired to that of Nicholas V., who received him with great honour; but as he was cited to appear at Florence, on pain of banifhment, the pope deputed him to go thither in the character of his embaffador. His conduct in this new fituation fo ingratiated him with his countrymen, that from a culprit he became a principal magiftrate. He afterwards returned to Rome, and was made fecretary to Nicholas V., in which poft he was continued by Calixtus III. Going to Naples on private bufinefs, Alphonfo kept him there with a penfion for three years, during which he compofed the greater part of his works. He died in 1459 with the character of one of the moft learned and excellent men of his age. He was deeply fkilled in the Hebrew language, and employed his great learning in this refpect to confute the Jews from their own fcriptures. He wrote a work againft their tenets in ten books, which is faid ftill to remain in MS. in the Laurentian library. Among his printed works are, "The Hiftory of Piftoia;" "The Lives of Nicholas V., Dante, Petrarch, and Boccaccio;" "The Funeral Oration of Leonardo Bruni;" "De Dignitate et Excellentia Hominis," and fome "Orations."

MANETTIA, in *Botany*, was named by Mutis and Linnæus, in honour of Xavier Manetti, curator of the Botanic Garden at Florence, who was born in the year 1723, and died in 1784. He publifhed, in 1747, a catalogue of fuch plants as grew in the garden at Florence, interfperfed with obfervations on the falutary and hurtful properties of vegetables. He alfo wrote a treatife upon the domeftic economy of making bread from different kinds of corn, but upon the whole prefers that which is made from *Triticum polonicum*. Linn. Mant. 553. Schreb. 75. Willd. Sp. Pl. v. 1. 624. Mart. Mill. Dict. v. 3. (Nacibea; Aubl. Guian. 95. t. 37. Juff. 199. Lamarck Illuftr. t. 64.)—Clafs and order, *Tetrandria Monogynia*. Nat. Ord. *Contortæ*, Linn. *Rubiaceæ*, Juff.

Gen. Ch. *Cal.* Perianth fuperior, of eight linear, concave, hairy, permanent leaves. *Cor.* of one petal, falver-fhaped; tube cylindrical, longer than the calyx, marked on the infide with four lines; limb divided into four fegments, which are fhorter than the tube, ovate, obtufe, bearded within. Nectary a rim furrounding the receptacle, quite entire, concave. *Stam.* Filaments four, thread-fhaped, very fmall, placed at the mouth; anthers linear, incumbent, two-celled. *Pift.* Germen inferior, turbinate, compreffed; ftyle thread-fhaped, bent down, the length of the tube; ftigma cloven, thickifh, obtufe. *Peric.* Capfule turbinate, compreffed, furrowed on both fides, of one cell and two valves, or feparable as it were into two capfules. *Seeds* few, flat, winged, orbiculate with a central embryo, imbricated on a pulpy oblong receptacle.

Eff. Ch. Calyx of eight leaves, fuperior. Corolla four-cleft. Capfule inferior, of two valves and one cell. Seeds imbricated, orbicular, with a central embryo.

1. M. *reclinata*. Linn. Mant. 558. Swartz. Prod. 37.—Leaves ovate, acute, downy. Stem reclined, herbaceous.—A native of Mexico.—*Root* annual. *Stem* weak and branching. *Leaves* oppofite, on footftalks, crowded, fomewhat fringed, an inch and half long. *Footftalks* very fhort, hairy. *Stipulas* oppofite, clofely faftened to the ftalks, femicircular, very fhort. *Flower-ftalks* axillary, folitary, fhorter than the leaves, many-flowered; partial ftalks oppofite, round, hairy, furnifhed with a fingle, fmall, acute *bractea*. *Flowers* white.

2. M. *Lygiftum*. Swartz. Prod. 37. Willd. n. 2. (Petefia Lygiftum; Linn. Sp. Pl. 160. Lygiftum; Brown. Jam. 142. t. 3. f. 2.)—Leaves ovate, acute, veiny. Stem twining, fomewhat fhrubby.—Native of Jamaica.—This weakly *fhrub* has a branched, twifted *ftem*, about feven feet in length. *Leaves* oppofite, on footftalks, large. *Flowers* in bunches, terminal, on long, branched footftalks, generally two together, or folitary. Swartz obferves that the calyx of this plant has eight leaves, and that the feeds are imbricated, which induced him to refer it to the prefent genus.

3. M. *coccinea*. Willd. n. 3. (Nacibea coccinea; Aubl. Guian. t. 37. f. 1.)—Leaves ovate, acuminate. Clufters many-flowered. Stem twining, fhrubby.—A native of Guiana, where it flowered and fruited in May.—*Root* perennial. *Stems* numerous, knotty, branched, fquare. *Leaves* at the knobs, in pairs, oppofite, on footftalks, fmooth. *Flowers* in clufters, the tube of the corolla white, marked with red dots; the limb of a fcarlet colour above, downy; the mouth of the tube clofed with yellow hairs.

4. M. *picta*. Willd. n. 4. (Nacibea alba; Aubl. Guian. t. 37. f. 2.)—Leaves ovate, acute. Calyx four-toothed. Stem twifting and climbing, fhrubby.—Found at the fame place with the laft, from which it differs in having the *calyx* four-toothed; the *corolla* fhorter and white; the *leaves* broader, and variegated with yellow.

5. M. *lanceolata*. Willd. n. 5. Vahl. Symb. p. 1. 12. (Ophiorrhiza lanceolata; Forfk. Defcr. 42.)—Leaves lanceolate. Calyx five-cleft, unequal. Flowers pentandrous. Stem erect.—A native of the lofty mountains of Hadie, in Arabia. *Stem* fhrubby. *Flower-ftalks* three together, terminal, the lateral ones thrice as long as that in the centre, cloven at the top. *Flowers* at firft heaped together, then racemofe, all directed one way.—Vahl obferves that this fpecies is nearly allied to *Cinchona*, and that it differs from the reft of this genus in the number of ftamens and fegments of the calyx.

MANFELOUT, or MAMFLOT, in *Geography*, a town of Egypt, on the left fide of the Nile, a mile from that river. Its name fignifies in Arabic "the place of Lot's exile;" and it is fo called, according to the Jefuit F. Vanfleb, who founds his opinion on a tradition of the Copts, becaufe a perfon of the name of Lot was banifhed thither by his brother, one of the ancient kings of Egypt. The town is tolerably large, being about a mile in circumference, and much handfomer than Miniet; its ftreets are wider and better paved. It is the capital of a diftrict, and agreeably fituated in a country that furnifhes abundance of productions of every kind; and its walls are fhaded by fruit-trees, overtopped by a number of lofty palms. It is governed by a kiafchef or cafhef, and is the fee of a bifhop, who prefides over about 200 Chriftians. Its commerce confifts of all forts ſorts of grain, and of linen cloths, which are manufactured here in great quantities. The Turks have different moſques, as well as a garriſon, in this place. Oppoſite to it is a Coptic convent, on the E. bank of the Nile, which is wholly incloſed with high walls, and into which the only mode of admiſſion, in order to be ſecure againſt the rapacious Arabs, is that of being hoiſted up in a baſket, by means of a pulley; whence it has obtained the name of the "Convent of the Pulley." Two leagues below Manfelout, on the eaſt bank of the Nile, is a chain of very high mountains, formed entirely of barren rock; the waters of the river have undermined them, ſo that their ſummit projects conſiderably beyond their baſe. This chain of rocks is called the mountain of "Aboufeda," from the name of a Muſſulman ſaint who is buried there, and in honour of whom a ſmall chapel has been erected. By the ſide of this monument of piety, or rather of the abſurd ſuperſtition of the Mahometans, ſome men of the ſame religion, who are devout worſhippers of ſaint Aboufeda, and, at the ſame time, determined robbers, live in retreats dug in the rock, and formerly, as it is ſaid, inhabited by Anchorites. But theſe excavations, as well as thoſe in Scheick Abadé, and in the two chains of mountains between which the Nile runs, in the upper part of Egypt, are probably burial places and ancient tombs. However this be, the perſons who now occupy them are the moſt formidable pirates that obſtruct the navigation of Egypt, and alſo the moſt difficult to be exterminated, as they take refuge in the inacceſſible cavities of theſe mountains. Manfelout is 13 miles N.N.W. of Siout. N. lat. 27° 42′. E. long. 31° 36′. Sonnini's Travels in Egypt.

MANFORT, a town of Africa, on the Gold Coaſt, in the country of Fantin.

MANFRED, or Mainfroy, in *Biography*, king of Naples and Sicily, was natural ſon of the emperor Frederic II.; on the death of his father in 1250, he became poſſeſſed of the principality of Tarento, and ſome adjacent counties. When his brother Conrad arrived from Germany, to take poſſeſſion of the Sicilian kingdoms, he became jealous of Manfred's power and abilities, and took from him a part of his inheritance, but upon the death of Conrad, he became poſſeſſed of the regency in behalf of his nephew, the infant Conradin. The pope, however, claimed the kingdom as fief to the holy ſee, and excommunicated Manfred, who being unable to make oppoſition, received his holineſs very ſubmiſſively in Naples. Soon after he raiſed a body of troops, and defeated the papal army, and after other ſucceſſes he recovered all the Neapolitan territory, and was received with great rejoicings into the city of Naples, where he behaved with much generoſity and clemency. He afterwards paſſed over to Sicily, and a report being ſpread of the death of Conradin, he was unanimouſly elected king by the Sicilian and Apulian barons, was accordingly crowned at Palermo in 1258, and by a mild and very equitable adminiſtration, ſecured the affections of the people. His peace was in a ſhort time diſturbed by intelligence, that Conradin was not only alive, but claimed the crown as his birth right; to which Manfred replied, that he had conquered the kingdom from two popes, and what he had won by his valour he could not think of reſigning, but would leave the kingdom to Conradin at his death. He founded a new city on the Adriatic, to which he gave the name of Manfredonia, and peopled it with the inhabitants of Siponto, which he deſtroyed on account of its unhealthy ſituation. His troops gained a ſignal victory over the Guelfs, in conſequence of which the city of Florence acknowledged his ſovereignty. In 1262, pope Urban IV. publiſhed a cruſade againſt him, and in the following year conferred the kingdoms of Naples and Sicily upon Charles of Anjou, brother of the French king Lewis IX. Charles prepared to invade the country, and Manfred was as zealous in his diſpoſitions to reſiſt him; but he was at length betrayed by his barons, who ſecretly negociated with his rival; and in February 1266, Manfred, engaging with the French army near Benevento, after fighting with great valour, was defeated and ſlain. As an excommunicated perſon, his body was thrown into a ditch, and buried under a heap of ſtones. The pope afterwards ordered it to be taken up, and carried out of the territories of the church. Manfred, though blackened by his enemies, diſplayed the talents and virtues of a great ſovereign; he was accompliſhed beyond moſt princes of his time, and if he were guilty of criminal ambition in gaining a crown, he wore it with honour. Mod. Univer. Hiſt.

MANFREDI, Eustachio, an Italian mathematician and aſtronomer, ſon of a notary, was born in the year 1674. He enjoyed the benefits of an excellent education, and made ſo great progreſs in his ſtudies, that at the age of eighteen, he obtained the degree of doctor of laws. He was, however, more attached to philoſophy and the mathematics than to mere legal diſcuſſions, and applied himſelf moſt diligently to the ſciences connected with or ſubſervient to the ſtudy of aſtronomy. In the midſt of his learned labours he found time to write poetry, and the pieces which he produced at this period, were, after the author's death, collected and publiſhed in an 8vo. volume, which has been many times reprinted. In 1698, Manfredi was nominated profeſſor of mathematics in the univerſity of Bologna. All the time that he was not employed in the duties of his profeſſorſhip, he devoted to the ſtudy of aſtronomy, and in company with Victor Stancari, he ſpent whole nights in contemplating the heavens, and obſerving the motions and paſſages of the ſtars and planets. An account was publiſhed of their obſervations made before the year 1703. In the ſame year Manfredi publiſhed a treatiſe "On the ſolar Spots," and in the following ſeaſon he was appointed by the ſenate of Bologna to the office of ſuperintendant-general of the rivers and waters of the Bologneſe. The duties of this office he conducted with a degree of ſkill and prudence, that proved highly beneficial to his country, and gave him a firſt rate reputation as a practical hydrauliſt. About the ſame time he was elected regent to the college of Monte-alto, founded by pope Sixtus V. at Bologna, for the education of young perſons of his province, who were intended for the church; in this ſituation, which was thought to be unworthy of his talents, he was enabled to do much for the eſtabliſhed religion, by ſending into its ſervice many celebrated divines, and others who ſuſtained a conſpicuous rank in the republic of letters. In the midſt of his various labours, Manfredi found leiſure to continue his aſtronomical ſtudies, and to attend to other mathematical ſubjects; at the ſame time he correſponded with men of ſcience in different parts of Europe, and began the compoſition of his famous "Ephemerides," which were afterwards publiſhed in ſeveral quarto volumes. In the year 1717, Manfredi was ſent to Rome, on the ſubject of a diſpute between the cities of Bologna and Ferrara, reſpecting the manner of conducting the inundations of the river Rheno into the Po. On his return home, he reſumed his aſtronomical labours, and in 1723 had the long wiſhed-for opportunity of obſerving a tranſit of Mercury over the ſun, of which he publiſhed an account in the following year, under the title of "Congreſſus Mercurii de ſolis in Aſtronomia Specula Bononienſis Scientiarum Inſtituti," &c. In 1726 he was admitted an aſſociate of the Royal Academy of Sciences at Paris, to whom he ſent a treatiſe "On the Method of determining the Figure of the Earth from the Parallax of the Moon," and another "On the Mode of defining the Solſtices, by the fixed Stars." In 1729, he was elected a foreign member of the Royal Society at London. In his latter years, he employed himſelf in completing his "Elements of Geometry and Trigonometry," which he had formerly drawn up for the uſe of a young nobleman, and his "Aſtronomical Inſtitutions." He died in the year 1739, when he was in the ſixty-fifth year of his age. He was author of a great number of works which have not been noticed above, but the titles of which may be found in "Fabroni Vit. Italor. Doct." He had a brother Gabriel, who firſt introduced into the univerſity of Bologna the ſtudy of algebra, and the new analyſis, and acquired much celebrity by his treatiſe "De Conſtructione Æquationum Differentialium primi Generis," publiſhed in 1707. He died in the year 1761, at the age of eighty. Moreri.

MANFREDONIA, in *Geography*, a ſea-port town of Naples, in Capitanata, ſeated on a bay of the Adriatic, called the "gulf of Manfredonia." King Manfred, who founded it in the year 1256, took great pains to give it permanent celebrity. Beſides ſeeking counſel as to the place and time of building it, from the moſt eminent aſtrologers, to whom he could have acceſs, he ſpared no labour or expence in the conſtruction of it. The port was ſecured from ſtorms by a pier, the ramparts were built of the moſt ſolid materials, and in the great tower was fixed a bell, of ſo large a ſize, that it might be heard over all the plains of Capitanata, to alarm the country in caſe of an invaſion. He alſo took care to have it erected into an archbiſhopric. Notwithſtanding all his precautions, it ſcarcely muſters 6000 inhabitants; though moſt of the corn exported from the province is ſhipped off here, and a direct trade carried on with Venice and Greece, with a view to which a lazaretto is eſtabliſhed. Vegetables of all ſorts are abundant in the vicinity of this town, and fiſh is plentiful and cheap; 93 miles N.E. of Naples. N. lat. 41 42′. E. long. 51° 56′.

MANFRO, a town of Africa, on the Gold Coaſt, near Cape Coaſt. The town is of an oval form, ſituated on the banks of a river, in a place almoſt inacceſſible, on account of rugged rocks that ſurround it. The inhabitants are inceſſantly employed in fiſhing, agriculture, and making ſalt, which is much wanted; and many of them act as factors to the merchants of the interior parts.

MANG, a river of the county of Kerry, which riſes in the mountains adjoining Cork and Limerick, and falls into Caſtlemain harbour, at the bottom of the great bay of Dingle, which can only admit veſſels of moderate burden. The Mang, which is navigable to Caſtlemain, was the northern boundary of the ancient county palatine of Deſmond. Beaufort.

Mang, in *Rural Economy*, a provincial word applied to ſignify a maſh of bran, malt, or other ſimilar ſubſtance.

MANGA, in *Gardening*. See Mangifera.

MANGABEY, in *Zoology*, the white eye-lid ape of Pennant. See Simia *Æthiops*.

MANGAGUABO, in *Geography*, a river of Braſil, which runs into the Atlantic, S. lat. 6° 56′.

MANGALA, in *Aſtronomy*, is the Sanſkrit name of the planet Mars, and he, as in Europe, preſides over Tueſday. In Indian paintings, he is repreſented of a deep red colour, with pink clothing, mounted ſometimes on a white ram, with red legs, ſometimes on a horſe, and holding a lotus and a ſtaff in his hands.

MANGALLO, in *Geography*, a town of Africa, in Querimba. S. lat. 10° 10′. E. long. 41° 20′.

MANGALLOON, a ſmall iſland near the N.W. coaſt of Borneo. N. lat. 6° 9′. E. long. 115 36′.

MANGALORE, a town of Hindooſtan, in the Canara country, on the coaſt of Malabar, with a good road for veſſels in the rainy ſeaſon. It was ceded to Britain in 1794; 124 miles W.N.W. of Seringapatam. N. lat. 12° 50′. E. long. 74° 44′.—Alſo, a town of Hindooſtan, in the Carnatic; 32 miles S. of Arcot.—Alſo, a town of Hindooſtan, in the circar of Rachore; 100 miles W.S.W. of Rachore.—Alſo, a town of Hindooſtan, in Guzerat, on the coaſt; 12 miles N of Puttan Sumnaut.—Alſo, a town of the Carnatic; 10 miles N. of Volconda.

MANGALUM, a town of Hindooſtan, in Coimbetore; 25 miles S.E. of Coimbetore.

MANGAN Islands, a cluſter of ſmall iſlands, in the gulf of St. Laurence, near the S. coaſt of Labrador. N. lat. 50° 15′. W. long. 63° 40.

MANGANADIA, a town of Hindooſtan, in Cochin; 20 miles N.E. of Cochin.

MANGANESE, in *Chemiſtry*, an elementary oxydable body, and a metal. It may be obtained in a ſtate of purity from any of its ores deſcribed in the next article. The native black oxyd, however, is the moſt convenient for affording this metallic ſubſtance. In order to obtain the oxyd free from the oxyds of other metals, the black oxyd muſt be diſſolved in muriatic acid. Sulphuric acid being gradually added, the lime and barytes, if it contain any, will be precipitated in the ſtate of ſulphats of thoſe earths. The ſolution may contain oxyds of iron and copper, beſides that of manganeſe. Carbonat of potaſh being added will diſſolve the manganeſe, but will precipitate the other oxyds. The oxyd of manganeſe may be afterwards precipitated by pure potaſh.

The above ſolution of the different metals may alſo be treated as follows. The copper may be precipitated by a clean piece of iron, and the iron be afterwards ſeparated by the ſuccinat of potaſh. The oxyd of manganeſe may at the laſt be ſeparated by pure potaſh. The oxyd of manganeſe, thus ſeparated, is in a ſtate of powder. Let this powder be made into a paſte with oil, and put into a crucible lined with charcoal, and filled up with powdered charcoal, the whole being cloſely covered. The crucible is now to be expoſed for an hour to the intenſe heat of a forge fire, or a blaſt-furnace, on the plan of Dr. Aikin's. At the bottom of the crucible will be found ſmall metallic grains, which are the manganeſe in its metallic form. For this proceſs we are indebted to Ghan, who firſt ſucceeded in the reduction of this metal.

This metal, when pure, is of a greyiſh-white colour, of tolerable metallic luſtre. Its ſpecific gravity is about 6.85. It is very brittle, and in hardneſs little inferior to iron. Hence it is not a malleable metal. It melts at 160° Wedgewood. It is not magnetic when perfectly free from iron.

It has no perceptible taſte or ſmell: when expoſed to the air it ſoon loſes its metallic luſtre, and changes into the ſtate of a brown powder, which ultimately becomes black. Theſe changes are produced by its combination with oxygen, for which it poſſeſſes a ſtronger affinity at the common temperature than any of the metals, with the exception of the baſis of the earth and alkalies. This property renders it of little or no uſe in the metallic ſtate.

It combines with three doſes of oxygen. The protoxyd, or firſt oxyd, is obtained by diſſolving the black oxyd of manganeſe in nitric acid, adding, at the ſame time, ſome ſugar or other inflammable matter, to take the exceſs of oxygen

oxygen from the black oxyd. The folution, by this treatment, becomes a nitrat of manganefe, with an oxyd at a minimum of oxydation. On pure potafh being added, the protoxyd is precipitated of a white colour. It is compofed, according to Bergman, of 80 of manganefe and 20 of oxygen in the 100.

This oxyd, expofed to the air, foon changes to a brown, and ultimately becomes of a black colour, by combining with more oxygen.

The fecond, or deuterotoxyd, is eafily obtained by diffolving black oxyd in fulphuric acid with heat. A portion of oxygen gas is feparated, fo as to conftitute this oxyd. If to the folution pure potafh be added, the oxyd is precipitated of a red colour. It is compofed of 74 of manganefe and 26 of oxygen, from the authority of Bergman. This oxyd, like the laft, attracts more oxygen from the atmofphere, and becomes black.

The black, or peroxyd of manganefe, may be obtained by expofing the other oxyds to the air for fome time. In a ftate of lefs purity it is found abundantly in nature, in which ftate it is ufed in bleaching linen and calico, to furnifh oxygen to the muriatic acid.

When expofed to a red heat it gives out one dofe of oxygen, and is converted into the fecond, or red oxyd. Hence its ufe in the chemical elaboratory for furnifhing oxygen gas.

It fometimes, however, contains carbonat of lime, in which cafe the gas obtained is liable to contain carbonic acid gas. The latter may be feparated from the oxygen by paffing the gas through lime water. The pure black oxyd is compofed of 60 of manganefe and 40 of oxygen.

The oxyds of manganefe have not been examined by many chemifts. We are indebted to Bergman for almoft the whole of our knowledge of thefe compounds. If bodies combine in limited dofes, according to the hypothefis of Dalton, the relative proportions of oxygen will be found incorrect. Agreeably to the proportion of the red oxyd, which is 26 *per cent.* Dalton fixes the atom of manganefe at 40, the oxygen being 7. Hence, for the protoxyd, we have $\frac{40 + 7}{7} = \frac{100}{15}$, or nearly 15 *per cent.* of oxygen. For the fecond oxygen we have $\frac{40 + 2 \quad 7}{2 \times 7} = \frac{\quad}{26}$, or 26 *per cent.* agreeably to the authority of Bergman.

The black, or peroxyd, from the fame data, will be $\frac{40 + 3 \times 7}{3 \times 7} = \frac{100}{34{\cdot}4}$, or 34·4 *per cent.* Hence it would appear that the protoxyd and the peroxyds are a little over-rated.

The black oxyd of manganefe is ufed in the manufacture of flint glafs, along with the oxyd of lead, to render the glafs colourlefs. The oxyd of manganefe alone would give to the glafs a purple colour, while the lead would render it of a yellow colour. In certain proportions, however, they produce no colour. May not this arife from the mixture of the three primitive colours conftituting whitenefs, namely, the purple, or blue and red, of the manganefe, with the yellow of the lead?

If this effect depended upon the oxygen of the manganefe, to which it has by fome been attributed, the glafs ought to be more coloured, from the oxyd of lead being more coloured in proportion to the oxygen it contains.

The black oxyd of manganefe, when mixed with drying oil to form paint, caufes fpontaneous inflammation.

Manganefe does not combine with hydrogen, nor, in all probability, with carbon.

The metal does not, according to Bergman, combine with fulphur. The fame chemift, however, fucceeded in combining its oxyd with fulphur, forming a fulphuretted oxyd. It is of a green colour, and affords fulphuretted hydrogen by treating with acids. There is ftrong reafon to believe that fulphuret of manganefe may be formed, fince a native fulphuret has been found.

Phofphorus combines with manganefe, forming a cryftalline, brittle, white fubftance, which is not decompofed at the common temperature.

It is more fufible than manganefe, but at this heat the phofphorus burns, and the manganefe combines with the oxygen of the atmofphere.

Manganefe combines with fome of the malats, forming alloys.

Mr. Hatchett fucceeded in alloying manganefe with gold by the following procefs. The black oxyd was frequently heated with oil, till the oil inflamed. By this means the oxyd was partly reduced. This fubftance was introduced, with fome gold, into a crucible lined with charcoal, and clofely covered; a ftrong heat was applied. The gold by this means combined with fome of the manganefe, forming an alloy of a yellowifh-grey colour. It was very hard, and fufceptible of a good polifh.

This alloy contained from $\frac{1}{9}$th to $\frac{1}{8}$th of manganefe. The gold could be feparated by cupellation.

Manganefe does not combine with mercury; it combines with copper, forming an alloy of a red colour, which is malleable.

It combines with iron with great facility, and is often a component part of iron, made from iron ores containing manganefe. It is faid to be effential to the formation of fteel, and that no iron can be ufed for making fteel but fuch as contains manganefe. This, however, is very doubtful. The alloys of manganefe with bifmuth and antimony are difficult to form, and of no importance.

Salts of Manganefe.—Although the oxyd of manganefe combines with the acids like the reft of the metallic oxyds, the properties of moft of thefe compounds have not been attended to by chemifts.

Sulphat of Manganefe.—When dilute fulphuric acid is applied to this metal the water is decompofed, hydrogen gas is evolved, and the acid combines with oxyd, forming a fulphat of manganefe. The folution of this falt is colourlefs; it affords cryftals by evaporation of a rhomboidal form. It has a bitter difagreeable tafte: when expofed to ftrong heat the acid efcapes.

This falt confifts of the protoxyd united with the acid; and agreeably to the hypothefis of Dalton, the atom of acid being 34, and the oxyd 40 + 7, the compofition of the falt ought to be $\frac{40 + 7 + 34}{34} = \frac{100}{42}$, which gives 100; 42 of acid and 58 of white oxyd.

Oxyfulphat of Manganefe.—This falt confifts of the red oxyd of manganefe combined with the acid.

It may be formed by diftilling a mixture of fulphuric acid with the black oxyd. A quantity of oxygen gas comes over, and a liquid of a purple colour, which is water, containing the oxyfulphat. When evaporated it affords a glutinous mafs, which gives fome cryftals with difficulty. When an alkali is added, the red oxyd is precipitated. This falt, from the above

above data, ſuppoſing it to be neutral, ſhould be compoſed as follows, $\frac{40 + 2 \times 7 + 34}{34}$, which gives 38.6 acid, and 61.4 red oxyd. The way in which this ſalt is prepared, renders it probable that it is ſuper-ſalt, a ſub-ſalt being left in the retort.

The ſuper-ſalt will be, therefore, $\frac{40 + 2 \times 7 + 34 \times 2}{34 \times 2} = \frac{100}{55.74}$, or 55.74 acid, and 44.26 of red oxyd. The ſub-ſalt would be $\frac{(40 + 2 \times 7) \times 2 + 34}{34} = \frac{100}{24}$, or 24 acid, and 76 red oxyd. The ſulphurous acid added to the black oxyd is converted into the ſulphuric acid, and diſſolves the remaining oxyd forming the ſulphat.

Nitrat of Manganeſe.—When the metal is added to dilute nitric acid, fumes of nitrous gas, mixed with nitrogen, and, perhaps, the nitrous oxyd, are diſengaged, ariſing from the decompoſition of part of the acid, while the remaining acid diſſolves the oxyd forming the ſalt in queſtion. It may alſo be formed by adding the black oxyd to the acid, at the ſame time adding ſome ſugar to take up the exceſs of oxygen, which the black oxyd contains above that of the white. Carbonic acid gas is, in conſequence, evolved, and the white oxyd is diſſolved.

The ſolution of this ſalt is colourleſs; it does not afford cryſtals by evaporation. If the heat be continued to dryneſs the ſalt is decompoſed, the acid being ſeparated.

Its component parts, ſuppoſing it a ſuper-ſalt, will be $\frac{40 + 7 + 19 \times 2}{19 \times 2} = \frac{100}{44.7}$, or 44.7 acid, and 55.3 white oxyd.

Muriat of Manganeſe.—The muriatic acid being added to the metal affords hydrogen from the decompoſition of the water, while the oxyd is diſſolved forming this ſalt. It conſiſts of the acid combined with the white oxyd.

When the black oxyd is digeſted in muriatic acid, one part of the acid combines with the exceſs of oxygen in this oxyd, forming the oxymuriatic acid, which eſcapes in the gaſeous form: the remainder of the acid unites with the white oxyd. Of this ſalt there is little known; it is difficult of cryſtallization, and is deliqueſcent.

When the muriatic acid is added to black oxyd in the cold, a red ſolution is formed, conſiſting of the red oxyd with the acid, and which is an oxymuriat of manganeſe. The muriat may, in all likelihood, conſiſt of $\frac{40 + 7 + 22}{22} = \frac{100}{32}$, or 32 and 67 baſe.

Phoſphat of Manganeſe.—This ſalt may be formed by adding phoſphat of ſoda to a ſoluble mangneſian ſalt. A white powder falls down, which is phoſphat of manganeſe. It is, therefore, inſoluble, or nearly ſo.

Fluats and borats of manganeſe may be formed by a ſimilar proceſs to the laſt: but theſe ſalts have not been examined.

Carbonat of Manganeſe.—This ſalt is more ſoluble than moſt of the metallic carbonats. In precipitating metallic oxyds from their ſolutions where manganeſe is contained by the alkaline carbonats, the latter oxyd is held in ſolution by the carbonic acid. This affords a ready method of ſeparating manganeſe from moſt other oxyds.

Oxalic acid combines with the oxyd of manganeſe, forming a ſalt in a ſtate of inſoluble white powder.

Tartarat of Manganeſe.—Tartaric acid added to the black oxyd of manganeſe, is partly decompoſed by heat. The carbon of the acid combines with exceſs of oxygen in the oxyd. The remaining acid afterwards diſſolves the reduced oxyd. On the citric acid it has a ſimilar effect.

Scheele informs us, that the arſenic acid diſſolves the white oxyd of manganeſe, forming a ſalt which affords cryſtals.

The ſuccinic acid forms a ſoluble ſalt with the white oxyd. The ſuccinat of potaſh has, in conſequence, been employed to ſeparate manganeſe from iron, the ſuccinat of the ſalts being inſoluble.

The reſt of the ſalts of this metal are not known.

MANGANESE. The ores of this metal may be divided into the following ſpecies: 1. Grey manganeſe; 2. Black manganeſe; 3. Red manganeſe; 4. Sulphuret of manganeſe; and 5. Phoſphat of manganeſe.

I. *The grey manganeſe ore* is ſubdivided into the *radiated*, *foliated*, *compact*, and *earthy*.

1. *Radiated grey manganeſe; Strahliges graubraunſtein-ertz*, Wern.; *Striated grey manganeſe ore*, Kirw.; *Manganèſe oxidé métalloïde gris*, Haüy.; *Manganèſe métalloïde chalybin*, Brongn.

Colour dark ſteel-grey, paſſing into iron black; ſometimes with variegated tarniſh. It occurs maſſive, diſſeminated, and cryſtallized.

The primitive form of the cryſtals is the four-ſided rhomboidal priſm, with edges of about 100° and 80°, according to Haüy; but of 115° and 65°, according to Hauſſmann's meaſurement. It is diviſible in the direction of its ſix planes; and, according to Haüy, alſo in that of the ſhort diagonal of the terminal planes; which latter is conſidered as erroneous by Hauſſmann; who, therefore, pronounces the form of the integrant molecule to be the ſame as that of the primitive cryſtal.

Its moſt remarkable ſecondary forms are:

A. The rectangular four-ſided priſm.

B. The oblique four-ſided priſm (being the primitive form).

a. Summits truncated; plane of truncation ſtraight.

b. Truncated obliquely at the ſummits: the plane of truncation either on one of the obtuſe, or on one of the acute lateral edges of the priſm. The truncation is ſometimes produced by two planes placed on two adjoining lateral planes.

c. Acuminated; the acuminating planes placed either on the obtuſe lateral edges (edge of acumination = 94° 7′ 6″), or on the acute lateral edges (edge of acumination 118° 40′ 36″.) The planes of acumination ſometimes again truncated.

d. Acuminated by four planes; the acuminating planes placed either on the lateral edges (with ſummit ſometimes truncated), or on the lateral planes. (Inclination of the acuminating on the lateral planes = 118 53′ 6.″)

C. The ſix-ſided priſm. (Two oppoſite, primitive, lateral edges = 65°, the four others = 147 30′.)

a. Summits truncated; plane of truncation ſtraight or flat.

b. Acuminated by two planes placed on the ſecondary lateral planes; at the other ſolid angles more or leſs truncated.

D. The eight-ſided priſm (with two lateral edges of 115°; two others of 124° 45′ 46″; and four of 150 7′ 7″.)

a. Summits truncated; plane of truncation ſtraight.

b. Obliquely

b. Obliquely truncated by two pentagonal planes.

c. Acuminated by four planes placed on the moſt obtuſe lateral edges.

d. Acuminated by ſix planes, four of which are placed on the obtuſe lateral edges, while the two others are placed either on the lateral edges of 124° 45′ 46″, or on thoſe of 115°.

e. Acuminated by eight planes placed on the lateral planes.

The cryſtals are generally aggregated and grown together in all directions; they ſometimes form globular aggregations. Their ſize varies, but they are ſeldom found exceeding one inch in length; and the generality of them are very ſmall. Upon the whole it may be ſaid, that their thickneſs is at leaſt four times exceeded by their length; while in the *foliated mangane/e* both dimenſions generally approach more to equality. The greateſt relative length we find in the ſix-ſided priſmatic cryſtals, which ſometimes are of a lanceolate ſhape, the breadth of the two ſecondary planes often increaſing to ſuch a degree, that but little remains of the four primitive planes.

By the union of ſeveral priſmatic cryſtals of equal length, a particular kind of priſmatic aggregations is frequently produced, having ſix, eight, or more lateral planes. They might be miſtaken for ſimple cryſtals, from which, however, they are eaſily diſtinguiſhable; 1. By their lateral planes ſeldom forming ſharp edges with one another, and being moreover always furniſhed with ſtriæ, and even deep furrows; and 2. By their acuminating facets never exhibiting continued planes, but only tranſverſal ſections intercepted by interſtices left by the aggregated priſms, which are in cloſe contact with each other.

The planes of the cryſtals are ſplendent, the primitive ones eminently ſo; the ſecondary planes are always longitudinally ſtriated. The ſurfaces of cleavage and fracture vary between ſhining and gliſtening: the luſtre is metallic. Yields a dull iron black ſtreak. It is opaque.

The texture of this ore is radiated, paſſing on one ſide into coarſe fibrous, on the other into foliated. The amorphous, maſſive, and diſſeminated radiated grey manganeſe ſometimes exhibits tranſverſal fiſſures in the radii, in the direction of the terminal planes of the nucleus.

Fracture uneven, frequently diſplaying ſmall granular maſſes, approaching to wedge-ſhaped. Fragments wedge-ſhaped, and long ſplintery; in the maſſive they are indeterminately angular and blunt-edged.

It is ſoft, brittle, and in large pieces pretty difficultly frangible. It ſoils ſtrongly when rubbed.

Specific gravity 3.530—4.325, Muſchenbroeck; 4.143, Hagen; 4.2491—4.7563, Briſſon; 4.181, Rinmann.

According to the analyſes given of the radiated grey manganeſe ore, by Klaproth, 100 parts afforded

	From Ihlefeld.	From Moravia.
Brown oxyd of manganeſe	90.50	89.
Water	7.	0.5
Oxygen gas	2.25	10.25
	99.75	99.75

Klapr. Beitr. ij.

This ore is found principally at Ihlefeld, on the Hartz; in Saxony, at Langeberg, Johangeorgenſtadt, Kamſdorf, Ilmenau, Salfeld in Thuringia; in Sileſia, at Konradſwaldau, Kupferberg, &c.; in Bohemia, at Mieſs, Platten; in the Bannat; in Carinthia, at Hüttenberg; on mount St. Gothard; in Piemont and Iſchia, in the Vicentine territory; in various parts of Great Britain, in Cornwall, Devonſhire, Somerſetſhire, Derbyſhire; and alſo near Aberdeen, in Scotland. Jameſon.

The radiated grey manganeſe ore of Ihlefeld occurs partly in veins, and partly as nodules, in clay-porphyry: it is accompanied with fleſh-red barytes, uſually cryſtallized in their ſexangular tables with fleſh-red or white rhomboidal calcareous ſpar, compact and foliated black manganeſe, and with friable lithomarge of a roſe-red colour. Hauſſmann in Mohr's Archiv. 1ſt b. p. 32.

2. *Foliated grey manganeſe ore; blättriges grau-braunſtein-ertz*, Wern. (var. of *Manganèſe oxidé métalloïde gris*, Haüy.)

Its colour is the ſame as that of the preceding ſub-ſpecies; it ſometimes in a ſtrong light appears iridescent.

It occurs maſſive, diſſeminated, and as covering of other ores. Alſo cryſtallized in four-ſided, rectangular, and rhomboidal priſms, whoſe planes are nearly equal to each other; and in low ſix-ſided priſms, with lateral planes either of the ſame breadth, or with ſecondary planes encroaching on the primitive, and thus producing rectangular tables, ſometimes bevilled at two oppoſite ſides, ſometimes rounded off: if rounded off in the whole of their circumference, the tabular paſſes into the lenticular form.

The cryſtals are generally globularly or botroïdally aggregated, and often form the uppermoſt covering in druſy cavities formed of black iron-ſtone, and lined by compact black, and amorphous foliated grey manganeſe ore. The oblique four-ſided priſms are ſometimes ſo intimately united, as to diſplay no more of their ſurface than a three-planed ſolid angle, formed by a terminating and two lateral planes. The cryſtals are always very ſmall; the magnifying glaſs diſcovers their lateral planes to be ſtriated; the terminating planes are ſmooth.

The luſtre of the ſurface of the cryſtals and of the cleavage is metallic ſplendent; that of the croſs fracture leſs ſo.

The texture of this ore is imperfect, and moſtly ſtraight foliated, often delicately ſtreaked, and paſſing over into radiated.

Fracture uneven, ſometimes exhibiting fine granular diſtinct concretions. Fragments indeterminately angular, blunt-edged.

It is ſoft, and brittle. It marks ſtrongly when rubbed. Yields a black dull ſtreak. Specific gravity 3.742, Hagen.

The foliated grey manganeſe ore is found in ſeveral places with the preceding ſub-ſpecies, to which it is, indeed, very nearly related. It formerly occurred plentifully in the mine St. Joachim, at Zellerfeld, on the Hartz, as coating of the druſy cavities in black and brown iron-ſtone, as alſo on quartz, &c. Hauſſmann, loc. cit.

3. *Compact grey manganeſe ore; Dichtes grau-braunſtein-ertz*, Wern.; *Indurated grey ore of manganeſe*, Kirw.

Its colour is bluiſh-black, paſſing into ſteel-grey; that of the ſtreak iron-black; in a ſtate of incipient decompoſition it takes a ruſt-brown hue. In a ſtrong light its ſurface is iridescent.

It is found maſſive, and in botroïdal maſſes, formed by the union of many globular diſtinct concretions. They are ſometimes confluent, when they form concentric, flat conchoidal diſtinct layers. The globules (at leaſt in the variety from Hertzberg, deſcribed by Hauſſmann) are divergingly radiated towards the centre; but towards the circumference, the radiated paſſes through fibrous and granular into perfectly compact. The flat conchoidal layers approach to the columnar, and here and there to the faſcicularly diverging radiated ſtructure, which again paſſes into compact.

Fracture even, very fine-grained, ſometimes inclining to flat

flat conchoidal. Fragments indeterminately angular, not very ſharp-edged.

It is hard, brittle, eaſily frangible. It ſoils leſs than the preceding ſub-ſpecies.

Internally it is either matt, *i.e.* dull, or gliſtening with a metallic luſtre; ſtreak generally ſhining.

Specific gravity 4.125, Hauſſmann.

According to an analyſis of Mr. Hauſſmann, it contains

Browniſh black oxyd of manganeſe	85
Silica	4
Oxygen	11
	100

The compact manganeſe of Romaneche, near Macon, in France, (which is remarkable for its conſiderable hardneſs, and in which barytes appears to be chemically combined with the metallic oxyd,) is, according to Vauquelin, compoſed of

Yellow oxyd of manganeſe	50
Barytes	14.7
Silex	1.2
Oxygen	33.7
Carbon	0.4
	100.0

It is found in Saxony, at Johangeorgenſtadt, in the Palatinate, where it occurs with lithomarge; at the Wurzelberg, in the Hertzberg foreſt, on the Hartz, where it is uſed as flux for the reduction of a rich, but very refractory red hematite. Hauſſmann, loc. cit.

In France it is found at Suquet, near Thiviez, department of Dordogne, in the neighbourhood of Perigueux. This is known by the name of *pierre de Périgueux.* Alſo at l'Aveline, near Saint-Diez, department of the Voſges; at Macon; at St. Micaud, department of the Saône and Loire. Brongn.

4. *Earthy grey manganeſe ore; Erdeges grau-braunſtein-ertz*, Wern; *Ochre of manganeſe*, Kirw.

Its colour varies between ſteel-grey and browniſh-black. Commonly maſſive or diſſeminated, ſometimes ſuperficial and dendritic.

Internally it is matt, or glimmering with metallic luſtre.

Fracture earthy, fine-grained; ſometimes fine ſcaly; fragments indeterminately angular, blunt-edged.

It ſoils ſtrongly, is very tender, and meagre to the touch.

It is found in Saxony, at Raſchau, Ilmenau, Ehrenſtock, &c. in Bohemia, in Cornwall and Somerſetſhire.

Brongniart refers to the earthy grey manganeſe that of Saint-Jean de Gardonenque in the Cevennes. It is very light and friable, and ſeparates, like baſalt, into irregular priſms. It occurs in granite.

Lenz, Wiedermann, and other authors, claſs with this ſub-ſpecies, the *black wad* of Derbyſhire and Devonſhire, which is alſo known under the name of *inflammable manganeſe*, on account of the property it poſſeſſes of inflaming ſpontaneouſly, when mixed with one-fourth of its weight of linſeed oil. It conſiſts, according to the analyſis of Wedgewood, of 0.43 manganeſe, 0.43 iron, and 0.04 lead. Werner firſt made a diſtinct ſub-ſpecies of it. According to other mineralogiſts, it is a variety of the black earthy manganeſe ore, (which ſee below.)

The *frothy manganeſe* (*Braunſtein-ſchaum* of Wiedenmann and others, *Manganeſe oxidé argentin*, Haüy,) appears likewiſe to be related to this ſub-ſpecies; but ſome dark coloured varieties have been referred to the black earthy manganeſe ore. They require to be ſubjected to cloſer examination.

II. *Black manganeſe ore; Schwartz braunſtein-ertz*, Wern. This is not ſubdivided by Werner; but Karſten, (in the new edition of his Mineralogiſche Tabellen,) and Reuſs (Mineralogie, v. p. 463.) diſtinguiſh the *indurated* and the *friable black manganeſe ores.* Hauſſmann, in his deſcription of the manganeſe ores from Ihlefeld, adds another, namely, the *foliated*, dividing the ſpecies, in the ſame manner as the grey manganeſe ore, into three ſub-ſpecies. Jameſon gives the following Wernerian deſcription of the black manganeſe ore.

Its colour is intermediate between browniſh-black and dark greyiſh-black.

Occurs maſſive, diſſeminated, and in octahedral cryſtals, which are ſmall, and very ſmall. The ſurface of the cryſtals is ſmooth and ſhining.

Fracture imperfect foliated, ſingle cleavage; ſometimes it inclines to uneven, and is alſo ſmall and ſcopiform, diverging radiated. Fragments indeterminately angular, blunt-edged.

Occurs in ſmall and fine granular diſtinct concretions. It is opaque. Gives a reddiſh-brown ſtreak. Is ſemi-hard, brittle, heavy.

It is found at Ehrenſtock, near Ilmenau, on grey antimony ore. Alſo at Rabenſtein, in Bavaria; at Zuhrbach, near Wagrain, in Salzburg; and at Miedzian, or Gora, in Weſt Gallicia.

The foliated black manganeſe ore of Hauſſmann was diſcovered at Ihlefeld by this diſtinguiſhed mineralogiſt, and firſt deſcribed by him in the ſeventh edition of Blumenbach's "Handbuch der Naturgeſchichte."

Its colour is coal black, approaching to a ſooty brown when paſſing into decompoſition. The powder is of an iron black colour.

It is found in curved lamellar layers of from ¼th to three lines in thickneſs, traverſing, in connection with compact black manganeſe ore, the clay-porphyry, which contains the veins of manganeſe ores in that diſtrict.

Its texture in one direction is imperfectly foliated; commonly ſtraight, ſeldom curved foliated.

Fracture uneven, of a fine grain. Fragments indeterminately angular, and not very ſharp-edged.

The ſurface of cleavage is ſemi-metallic, ſhining; that of the fracture is dull, or at beſt faintly glimmering, ſtreak ſhining. It is opaque. Semi-hard; rather brittle. Specific gravity from 3.7142—3.800.

The foliated black manganeſe ore is infuſible before the blowpipe; but with borax it melts into a purpliſh enamel. It ſtrongly effervefces with the mineral acids, and is precipitated by cauſtic alkalies, as brown, by carbonic acid, as white oxyd of manganeſe.

It has a near oryctognoſtic relationſhip to the manganeſe blende of Tranſylvania, from which, however, it is eaſily diſtinguiſhable, both by its chemical properties, and by colour and ſtreak. By decompoſition it paſſes into the compact black manganeſe ore.

It is accompanied with radiated grey manganeſe ore, compact black and red manganeſe ores, with calcareous ſpar, and lithomarge of a roſe red colour.

The compact black manganeſe ore of Hauſſmann is divided into *indurated* and *friable.*

The *indurated* variety is of a deep black colour; that of the powder is a ſooty or browniſh-black.

It

Strahan and Preſton,
New-Street Square, London.

It is found maſſive, and in thin curved lamellar layers. It is dull; ſtreak ſhining or glimmering.

Fracture fine earthy; fragments indeterminately angular, blunt-edged. It is ſoft; ſoils ſtrongly; feels meagre, and adheres to the tongue.

It has been found in St. Joachim mine, Zellerfeld (the maſſive), and at Ihlefeld, where it traverſes clay-porphyry in all its directions. It is accompanied by foliated black mangaueſe ore, which appears to paſs into it by decompoſition.

The *friable* variety is of a black and browniſh-black colour.

It is found maſſive, in globular maſſes, in thin curved lamellar diſtinct concretions on black hematite, often alſo as thin coating on black hematite, and dendritic.

Internally it is dull; the ſurfaces of the lamellar diſtinct concretions ſometimes glimmering; ſtreak ſhining.

Fracture fine earthy, fragments indeterminately angular, blunt-edged. It is perfectly friable; ſoils ſtrongly, feels meagre, and adheres ſtrongly to the tongue.

The variety from Hutthal, or the Hartz, was analyſed by Klaproth with the following reſult:

Brown oxyd of manganeſe	68
Oxyd of iron	6.50
Carbon	1
Barytes	1
Silica	8
Water	17.50
	102.0

It is found on the Hartz at the Iberg, at Zellerfeld, at the Galgenberg, near Clauſthal, and in the Hutthal, on the Hartz, where, according, to Klaproth, it was found iſſuing from the chinks of rocks as a moiſt, greaſy ſubſtance, which, on being expoſed to the air, was ſoon converted into a very fine black powder.

The fineſt dendritic varieties, from the Hartz, are thoſe of Grund, on a greyiſh-white marle-ſlate; and thoſe of Lerbach, on a green clay-ſlate.

Reuſs, who deſcribes the friable black manganeſe ore, refers to it the *wad*, mentioned above as a variety of the earthy grey manganeſe ore. It is, indeed, difficult to determine to which of the two the Engliſh black wad belongs, the different varieties of which require to be ſubjected to further examination.

Another ſubſtance nearly related to the wad is the *frothy manganeſe*, a metallic, reddiſh-brown, ſilmy ſubſtance, incruſting black hematite, and referred by ſome mineralogiſts to iron froth, by others to the earthy grey manganeſe.

III. *Red manganeſe ore; Rother braunſtein*, Werner; *Manganèſe ſilicifère blanc et roſe*, Haüy; *Manganèſe lithoïde blanc et rouge*, Brongn.

Its colour is roſe red of various intenſity; and ſometimes a very light yellowiſh-brown.

It occurs maſſive and diſſeminated.

Internally it is dull.

Fracture even, paſſing into large and flat conchoidal, and alſo ſometimes into ſplintery fragments: indeterminately angular, pretty ſharp-edged.

It is ſlightly tranſlucent, hard enough to ſcratch glaſs; brittle, and eaſily frangible.

Specific gravity 3.233, Kirwan, that of the Siberian 3.676, Lampadius.

Is infuſible before the blowpipe without addition, but aſſumes a browniſh colour; if the flame be urged by oxygen gas, ſmall particles will melt into a browniſh-black bead, attractable by the magnet. The Siberian red manganeſe ore, analyſed by Lampadius, is ſtated by this chemiſt to be fuſible by the heat of the blowpipe, when continued for a few minutes, into a ſhining black enamel; and much more eaſily with borax.

According to the analyſis given by Ruprecht, that from Tranſylvania conſiſts of

Oxyd of manganeſe	35.15
Oxyd of iron	7.04
Silica	55.06
Alumine	1.56
Water	0.78
	99.59

The analyſis of red manganeſe from Kapnik by Lampadius, appears to be that of a red variety of pearl-ſpar; (or perhaps of real carbonat of manganeſe.) The ſame chemiſt has, however, given an analyſis of the red manganeſian foſſil from Siberia, which certainly belongs to the ſubſtance under conſideration, although Mr. Lampadius himſelf appears to be of a different opinion. The reſults of his analyſis are

Oxyd of manganeſe	0.610
Oxyd of iron	0.050
Silica	0.300
Alumine	0.020
Loſs	0.020
	1000

The red manganeſe ore of Kapnik, which is placed by Mohs, near pearl-ſpar, under the name of Rothſtein, is found there as part of a vein formation, together with black ſilver ore, (Schwartz-giltig-ertz,) brown and yellow blende, galena, quartz, and now and then with ſome pearl-ſpar. The veins containing this formation are moſtly narrow, and often of a ſtratified ſtructure, in ſuch a manner that either maſſive quartz, or a mixture of quartz and red manganeſe, (Rothſtein), alternate with ſtrata of black ſilver ore, and blende, or galena, from the ſides towards the centre of the vein, where the druſes are generally incruſted with cryſtallized quartz, or alſo with pearl-ſpar. This, according to Mohs, is the general nature of thoſe veins, which however, alſo contain other foſſils beſides.

IV. *Sulphuret of manganeſe; Braunſtein blende; Manganglantz*, Karſt.; *Schwartz*, Klapr. Reuſs.

Its colour is between iron and pitch-black, here and there with a ruſt-coloured covering, often with variegated tarniſh. Colour of the powder dark braſs-yellow paſſing into greeniſh.

It is found maſſive, or coarſely diſſeminated in red manganeſe ore, which it alſo traverſes in foliated layers.

Texture in one direction imperfectly foliated; direction of the folia approaching to curved foliated. According to Haüy it is diviſible into a rhomboïdal priſm, which may be ſubdivided in the direction of the diagonals of its tranſverſal ſection.

It is opaque; its luſtre is ſemi-metallic ſhining; the ruſt-coloured decompoſing parts dull; ſtreak ſhining.

Fracture fine-grained uneven; fragments indeterminately angular, not particularly ſharp-edged.

It is ſoft, mild, and not difficultly frangible. Specific gravity 3.950. Klapr.

Infuſible before the blowpipe. When pulverized it gives out ſulphureted hydrogen as the addition of nitrous acid.

Strahan and Preſton,
New-Street Square, London.

According to Klaproth's analyfis, it confifts of

Oxyd of manganefe	82
Carbonic acid	5
Sulphur	11
	98

Klapr. Beitr. 3.

Vauquelin is of opinion, that the carbonic acid in the preceding analyfis belongs to the matrix of this ore. According to this chemift the conftituents are: manganefe at the minimum of oxydation 85, and fulphur 15.

It is found in Tranfylvania, in red manganefe ore accompanied with black tellurium, red and brown blende (fulphuret of zinc), copper pyrites, &c.

According to Delrio it has alfo been lately found in Mexico.

V. *Phofphat of manganefe; Phofphor-mangan,* Karft.; *Eifen-pech ertz,* Wern.; *Manganèfe phofphaté (ferrifère),* Haüy.

Its colour is reddifh and blackifh-brown, which paffes into black; colour of the ftreak greyifh, yellowifh, or reddifh-brown.

It occurs maffive. According to Haüy it is divifible in the direction of planes, which appear to indicate a rectangular parallelopipedon for the nucleus.

Internally it is fhining and gliftening, with a refinous luftre.

Fracture flat and imperfectly conchoidal, paffing into fine-grained uneven; fragments indeterminately angular.

It is faintly tranflucent at the edges.

It is femihard, paffing into foft; brittle.

Specific gravity 3.95.

It is readily fufible before the blowpipe into a black enamel; and is entirely foluble in nitric acid without effervefcence.

It is feldom found pure, generally containing iron, which, however, according to Darcet, appears to be accidental; the phofphoric acid being probably combined with the manganefe alone.

The light coloured varieties contain but a fmall quantity of iron.

Vauquelin, who analyfed this ore, obtained the following refult:

Oxyd of manganefe	42
Oxyd of iron	31
Phofphoric acid	27
	100

Journ. des Mines.

It has hitherto been found only near Limoges in France; it occurs in granite, in the fame veins that contain the well known opaque beryl.

MANGANUM, Μαγγάνον, among the Greeks, a general name for inftruments to throw large ftones with.

MANGATTI, in *Geography,* a town of Hindooftan, in Travancore; 18 miles N.E. of Anjenga.

MANGAVEIRAS, a town of Brafil, in the government of Para; 35 miles N.E. of Engenhoreal.

MANGEABOONG, a town on the N.W. coaft of Borneo. N. lat. 6° 3'. E. long. 116° 9'.

MANGEART, Thomas, in *Biography,* a learned monk, who obtained a very high reputation by his knowledge, and was appointed antiquary, librarian, and counfellor to duke Charles of Lorrain. He died in 1763, and is known in the republic of letters for a work entitled "Introduction à la Science des Medailles," fol. This work contains all the principles laid down in the elementary treatifes on the numifmatic fcience, and ferves as a fupplement to the "Antiquité expliquée" of Montfaucon.

MANGEE, in *Geography,* a town of Hindooftan, in Bahar; 13 miles W.N.W. of Chupra.

MANGEEA, or Mangya, an ifland in the South Pacific ocean, difcovered by captain Cook in the year 1777; but on which he could find neither a landing place nor anchorage. Such parts as fell under our navigator's obfervation were guarded by a reef of coral rock, on the outfide of which the fea is of an unfathomable depth. It is full five leagues in circuit, and of a moderate and pretty equal height; though, in clear weather, it may be feen at the diftance of ten leagues. In the middle it rifes into little hills, from which there is a gentle defcent to the fhore, which, at the S.W. part, is fteep, though not abuve 10 or 12 feet high, and has feveral excavations made by the beating of the waves againft a brownifh fand-ftone of which it is compofed. The defcent is covered with trees of a deep green colour, very thick, but not high, feeming to be of the fame fort, except near the fhore, where are many of that fpecies of dracæna found in the woods of New Zealand. On the N.W. part the fhore terminates in a fandy beach, beyond which the land is broken down into fmall chafms or gullies, and has a broad border of trees refembling tall willows. Farther on the afcent, the trees were of the deep green above-mentioned; and were fuppofed by fome to be the rima, intermixed with low cocoa-palms, and a few of fome other forts. On the little hills were trees of a taller fort, thinly fcattered; but the other parts were bare, and of a reddifh colour, or covered with fomething like fern. Upon the whole Cook obferves, that the ifland has a pretty afpect, and might be made a beautiful fpot by cultivation. When this ifland was firft difcovered, feveral of the natives were obferved to be armed with long fpears and clubs, which they brandifhed in the air either with figns of threatenings, or, as fome thought, with invitations to land. Moft of them appeared naked, except having a fort of girdle, which paffing between the thighs covered that part of the body. Some of them, however, had pieces of cloth of different colours, which they wore as a garment, thrown over their fhoulders: and almoft all of them had a white wrapper about their heads, not much unlike a turban, or like a high conical cap. Their colour was tawny, and they were in general of a middling ftature, but robuft and inclining to corpulence. They were at firft afraid of approaching the fhip in their canoe; but being addreffed by Omai in the Otaheitean language, their apprehenfions fubfided, and they came near enough to take fome beads and nails, which were thrown into their canoe. They were at firft afraid of touching thefe things, which probably arofe from fuperftition; for Omai underftood, that when prefents were offered them, they afked fomething for their "Eatooa," or god. When they were afked, if they ever ate human flefh; they anfwered in the negative, with a mixture of indignation and abhorrence. They wore a kind of fandals, made of a graffy fubftance interwoven, probably to defend their feet againft the rough coral rock on the fhore. Their beards were long; and the infide of their arms, from the fhoulder to the elbow, and fome other parts, were punctured or tattooed, like the inhabitants of almoft all the other iflands in the South fea. The lobes of their ears were pierced, or flit, to fuch a length, that one of them ftuck there a knife and fome beads which had been given him; and the fame perfon had two polifhed pearl-fhells and a bunch of human hair, loofely twifted, hanging about his neck,

neck, which was the only ornament that was obferved. The only canoe, that was feen, was not above 10 feet long, and very narrow, but both ftrong and neatly made. As the inhabitants feemed to be numerous and well fed, fuch articles of provifion as the ifland produces muft be very plentiful. One of the iflanders who came on board informed our navigators, that they had no animals, as hogs and dogs, both which they had heard of; but acknowledged that they had plantains, bread fruit, and taro. The only birds that were feen were fome white egg-birds, terns, and noddies; and one white heron on the fhore. The language of the inhabitants of Mangeea is a dialect of that fpoken at Otaheite; though their pronunciation, like that of the New Zealanders, be more guttural. The natives of Mangeea feem to refemble thofe of Otaheite and the Marquefas in the beauty of their perfons, more than thofe of any other nation feen by Capt. Cook in thofe feas; having a fmooth fkin and not being mufcular. Their general difpofition alfo correfponds with that which diftinguifhes the firft mentioned people; for they are not only cheerful, but are acquainted with all the lafcivious gefticulations which are practifed by the Otaheiteans in their dances. Their houfes alfo feem to refemble thofe of Otaheite. They falute ftrangers much after the manner of the New Zealanders, by joining nofes; adding, however, the ceremony of taking the hand of the perfon to whom they are paying civilities, and rubbing it with a degree of force upon their nofe and mouth. Cook's Third Voyage, vol. i.

MANGEL WURZEL, in *Agriculture*, a plant of the tap-rooted kind, which has been lately introduced into field culture. It is a variety of the common beet. The author of a late work on hufbandry remarks, that it grows to a large fize, both in the root and top, the former being of a reddifh caft, and the leaves in the latter of an oblong form, extremely thick, flefhy, and fucculent. Mr. Young, however, obferves, that it is but little in cultivation at prefent; though in Norfolk, fir Mordaunt Martin finds the root advantageous for his cow ftock. The leaves are afferted to be "equal in quality to fpinach, and from their frequently extending in length more than thirty inches, and in breadth above twenty, to greatly exceed that vegetable in point of produce."

Soil.—This, like all other tap-rooted plants that have been employed for the purpofes of hufbandry, thrives the beft in foils of the deep, friable, fandy, or light loamy defcriptions.

Preparation.—In preparing the ground for its reception, it is neceffary to render it as deep and fine as poffible in the mould. This may be beft effected in the heavier forts of land, by means of trench ploughing, in the manner of that for parfnips; and in thofe of the lighter kind, by repeated common deep ploughings. In both cafes, the frequent ufe of the harrows will be requifite. A proportion of good manure fhould alfo be turned in, fo as to render the ground fufficiently rich for the perfect growth of the plants. After this, at the time of putting in the feed, the land fhould be thrown into two-bout ridges, which leaves the tops about two feet in breadth, and the furrows one. In this way a confiderable increafe in the depth of mould is provided for the roots of the plants. And in foils that are in fome meafure retentive of moifture, the lands are kept much drier, and in a ftate more fit for the growth of the plants.

Seed and Method of fowing.—It is advifed, that the feed fhould be carefully felected from fuch plants as are the moft perfect of their kind, and that have been cultivated at a diftance from other varieties. It fhould have arrived at a full ftate of ripenefs, and be made ufe of while frefh. The moft proper feafon for putting the feed into the ground in the common method of fowing, is in the early part of the fpring as foon as the feafon will admit, as in the beginning or middle of April; but where the tranfplanting method is intended, it fhould be fown much earlier and very thinly, as the beginning of March, in order that the plants may be in a ftate to be fet out.

The moft common method, where the furface of the land is flat, is to fow the feed thinly over the ground, in the manner that is practifed for carrots, covering the feed in by means of very light harrowing. In this way, the plants are afterwards fet out by the hoe to proper diftances. But where the land is raifed into ridges in the manner juft defcribed, another mode is practifed: the feed is dropped fingly by the hand into little holes made by a dibble, to the depth of about half an inch, all along the middle of them, at the diftance of eight or nine inches from each other; the plants thus ftanding at the diftance of three feet, from row to row, and eight or nine inches apart in them. But as it is not neceffary that they fhould ftand nearer than 16 or 18 inches, every other plant may be removed, and ufed for filling up vacancies, where they occur, or if not wanted in that way, wholly removed by the hoe. In this mode the intervals can be kept perfectly clean by the plough or horfe-hoe, and the rows by hand-hoeing.

In the practice of tranfplanting, the plants fhould be removed, when not more than three or four inches in length, and be planted out in rows upon ridges prepared as above at the diftance of 18 inches each way. In performing the work, the holes fhould be made fufficiently deep to admit the roots without their being bent. The tops of the plants may be taken off before planting, but the roots fhould not be touched, nor fhould they be put in too deep. A rather moift feafon fhould be chofen, if poffible, for this bufinefs. But though the plants grow well in this method, the roots feldom become fo large as when they have remained in their original fituation.

All the culture that is afterwards neceffary in this fort of crop, is to fet out the plants to proper diftances, where put in, in the firft methods, and keep them clear from weeds by one or more hoeings, according to the manner of fowing that may have been practifed, and other circumftances.

It has been ftated that the application of this vegetable "has been chiefly in the feeding of neat cattle and hogs; in which both the tops and roots have been employed, but without that fuccefs which might have been expected from the manner in which it was brought to the notice of cultivators." It is probable, that upon the whole, the root has neither been found to be equal in quality as a cattle food, or to afford the quantity of produce that was fuppofed upon its firft introduction, but from its being of a hardy nature, and not liable to be injured, either by infects or the effects of drought, as well as from its leaves being capable of being repeatedly cut over, it may be occafionally cultivated in fituations where green food is much wanted in the latter end of the year, for milch cows or other forts of live ftock.

In fome trials detailed in the Annals of Agriculture, the plants feem, however, to have afforded a large produce in leaves, when gathered every two or three days, from July till late in September; others have not found the whole produce, in leaves and roots, equal to that of the large cabbage, on the fame kinds of foil, while the culture was confiderably more troublefome and expenfive, and the crop not fo ufeful for the purpofe of winter confumption.

In the trials of an ingenious cultivator, as stated in the Bath Papers, the tops were found to be eaten with much greediness by cows, calves, and hogs, when cut green, during the latter part of the summer and in autumn, but the roots were almost wholly rejected at these periods, though in winter, after they had been taken up, they were eaten very well.

The great objections to this vegetable, as a field plant, are, according to a late writer, ' the great expence of its culture, its being liable to degenerate, and the fibrous nature of the roots rendering their preparation as cattle food troublesome."

The roots frequently rise, it is said, to the weight of from five to eight or ten pounds, according to the goodness of the land; and they may be preserved in the winter, by being taken up and packed in the manner of carrots, or any other method.

MANGEN, in *Geography*, a town of the duchy of Courland; 10 miles S.W. of Piltyn.

MANGER, in *Ship Building*, a place parted off immediately within the hawse-holes. It prevents whatever water that comes in at the hawse-holes from running off, and is returned back again by the scuppers in the manger.

MANGER, in *Rural Economy*, an internal part of the stable in which the corn or cut provender of the horse is put. It is a sort of box or crib, and the usual method is to have them the whole breadth of the stall; but this is unnecessary, as when eighteen or twenty inches in length, and fourteen or sixteen in breadth, they will be sufficient for every useful purpose. In the fixing of them they should be so contrived as to admit of being removed for the purpose of being cleaned. This can, however, never be done in the old method of fixing them: but, by a little contrivance, may be easily effected. It is, in many cases, a convenient plan to have them in the corners or angles at the heads of the stalls. See STABLE and STALL.

MANGERA, in *Geography*, an island of Mexico, about four miles in circumference, in the gulf of Amapalla.

MANGERA *Strait*, a channel of the East Indian sea, between the islands of Cumbava and Flores, full of small islands. Flores is also called Mangeray.

MANGERBARY, a town of Hindoostan, in Visiapour; 15 miles S. of Merritch.

MANGERTON, a mountain of Ireland, in the county of Kerry, S. of the lake of Killarney, and forming a very interesting object in the scenery of that beautiful and romantic spot. It is one of the highest mountains in Ireland, being 2500 feet above the lake. From its summit, the two lakes, with the passage between them, and a large tract of country, may be seen to great advantage. To ascend Mangerton should therefore be a fixed object of every person who visits Killarney.

MANGET, JOHN JAMES, in *Biography*, a laborious medical writer, was born at Geneva in June, 1652. After going through his classical studies and the courses of philosophy, he commenced the study of theology, with the intention of entering the clerical profession, but after five years of labour, his inclination to medical pursuits prevailed, and by the aid of books alone, without any teacher, he made such a progress, that he was admitted to the degree of M.D. at Valence, in Dauphiny, in 1678. He then commenced the practice of physic, in which he obtained considerable reputation in his native city, which he refused to quit, though solicited by invitations from various quarters. In 1699, Frederick III. elector of Brandenburg, and afterwards the first king of Prussia, honoured him with the appointment of his first physician. In his literary labours, Manget was indefatigable, even to the end of his long life. He maintained a correspondence with many of the learned men of his time, some of whom, especially Daniel le Clerc, the author of the History of Medicine, are said to have assisted him in his works. He died at Geneva in August, 1742, in the ninety-first year of his age.

Among the numerous works of compilation, which Manget executed, originality is not to be expected; nor are they remarkable for judgment and accuracy. They are, however, still useful for reference. They are as follows: 1. "Messis Medico-spagyrica, &c." folio, Geneva, 1683; which contains a most abundant collection of pharmaceutical preparations, arranged in a very complex order. 2. In the same year he edited, "Pauli Barbette Opera omnia Medica & Chirurgica," with additional cases and illustrations. 3. "Bibliotheca Anatomica," 1685, two vols. folio; a work which was executed in conjunction with Daniel le Clerc. He afterwards edited; 4. The "Compendium Medicinæ Practicum," of J. And. Schmitz. 5. The "Pharmacopeia Schrodero-Hoffmanniana." 6. The "Tractatus de Febribus" of Franc. Picus; and 7. The "Sepulchretum" of Bonetus, to which he added several remarks and histories. 8. In 1695, he published his "Bibliotheca Medico-Practica," four vols. folio; a vast collection of practical matter relative to all the diseases of the human body, arranged in alphabetical order. Other compilations of a similar kind he afterwards published relative to surgery, chemistry, and pharmacy: *viz.* 9. "Bibliotheca Chemica curiosa," two vols. folio, 1702; 10. "Bibliotheca Pharmaceutico-Medica," two vols. folio, 1703; and 11. "Bibliotheca Chirurgica," four vols. in two, folio, 1721. But in the mean time, he had printed his (12.) "Theatrum Anatomicum, cum Eustachii Tabulis Anatomicis," two vols. folio, 1716. This is a description of all the parts of the body, abridged from various authors; the osteology is that of Bidloo; the myology that of Brown; and the splanchnology that of Ruysch; and his selections are not to be praised. It has been justly objected to him, that he omitted to notice the discoveries of the anatomists of the sixteenth century. There is scarcely any thing of his own in this work, except some morbid dissections. On the appearance of the plague at Marseilles, he published a collection of facts and opinions on that disease, under the title of "Traité de la Peste recueilli des meilleurs Auteurs," two vols. 12mo. 1721: and, in the following year, 14. "Nouvelles Reflexions sur l'Origine, la Cause, la Propagation, les Preservatifs, et la Cure de la Peste," 12mo. 15. His "Observations sur la Maladie qui a commencé depuis quelques années à attaquer le gros Betail," was a collection of the opinions of the Genevese physicians concerning the distemper of horned cattle. The last work of Manget was his "Bibliotheca Scriptorum Medicorum veterum et recentiorum," at which he laboured when at least eighty years of age, and published it in two vols. folio, in 1731. It is the most important of his productions, being an useful collection of medical lives, and catalogues of writings. Eloy Dict. Hist. Gen. Biog.

MANGEY, THOMAS, a learned English divine, was educated at St. John's college, Cambridge, where, in due time, he took his degree of D.D. He was distinguished in the church as prebendary of Durham, and published an edition of "Philo Judæus," in 2 vols. folio: "An Answer to Toland's Nazarenus;" and a volume of "Sermons on the Lord's Prayer." He died in the year 1755.

MANGIFERA, in *Botany*, is that celebrated fruit of the East Indies called *Mango*, whose different varieties are universally known and cultivated in that country, being as much esteemed, and nearly as various in quality, as the different

different kinds of apples produced in England. The vernacular name of this fruit, which may be confidered as a fort of plum, is *Manga*, or *Manghos*, and this appellation being coupled to the verb *fero*, to bear, fhews the derivation of its generic name. Linn. Gen. 110. Schreb. 153. Willd. Sp. Pl. v. 1. 1150. Ait. Hort. Kew. ed. 2. v. 2. 39. Juff. 369. Lamarck Illuftr. t. 138. Gærtn. t. 100. —Clafs and order, *Pentandria Monogynia*. Nat. Ord. *Terebintaceæ*, Juff.

Gen. Ch. *Cal.* Perianth inferior, deeply cloven into five, lanceolate fegments. *Cor.* Petals five, lanceolate, furrowed, longer than the calyx. *Stam.* Filaments five, awl-fhaped, fpreading, as long as the corolla; anthers inclining to heart-fhaped. *Pift.* Germen fuperior, roundifh; ftyle thread-fhaped, the length of the calyx; ftigma fimple. *Peric.* Drupa kidney-fhaped, oblong, keeled, compreffed. *Seed*, an oblong, compreffed, woolly nut.

Eff. Ch. Corolla of five lanceolate petals. Drupa fuperior, kidney-fhaped. Nut woolly.

1. M. *indica*. Mango Tree. Linn. Sp. Pl. 290. Jacq. Ic. Rar. v. 2. t. 337. Andr. Bot. Repof. t. 425. (Manga domeftica; Rumph. Amboin. v. 1. 93. t. 25.)—Leaves ftalked, lanceolate-oblong. Four of the ftamens abortive. —Native of the Eaft Indies. With us it is kept in the ftove, where it bloffoms in fpring and autumn, though rarely. In India it forms a tall and fpreading *tree*, not unlike an oak in its manner of growth, with thick and wide-extended branches, but the wood is far more brittle and lefs hard and firm. *Leaves* fcattered, ftalked, fimple, about a fpan long, and an inch or two wide, wavy, entire, tapering at each end, veiny, fmooth and fhining. *Panicles* terminal, compound, fpreading, downy, of innumerable fmall white *flowers*, moft of which are abortive. *Fruit* the fize of a large plum, of an orange or tawny colour with a tinge of red; its pulp extremely juicy, with a rich fweet perfumed flavour, accompanied by a grateful acidity. Rumphius fays it is the fineft Indian fruit except the Mangoftan; (fee GARCINIA.) In an unripe ftate it makes an excellent pickle, often brought to Europe.

2. M. *laxiflora*. Loofe-flowered Mango. Lamarck Dict. v. 3. 697. Willd. n. 2.—" Leaves ovato-lanceolate, nearly feffile. Stamens all perfect. Fruit roundifh." —Native of the ifland of Mauritius. We know this fpecies merely by Lamarck's account. It is faid to have the habit of the foregoing, but the *leaves* are nearly feffile, the *panicles* more elongated and lax, the *ftamens* all perfect, fegments of the *calyx* much more obtufe, and the *fruit* fmaller, more oval and rounded.

3. M. *axillaris*. Axillary-flowered Mango. Lamarck Dict. v. 3. 697. Willd. n. 3.—" Leaves ovate-oblong, bluntifh. Panicles axillary. Stamens ten."—Found by Sonnerat in the Eaft Indies. Lamarck, who received it from that intelligent traveller, defcribes this fpecies as clearly diftinguifhable from the two former by the above characters. The *leaves* are four or five inches long, and near two in breadth. *Fruit* the fize of a fmall cherry, but that author faw it only in a dry, and poffibly unripe ftate.

Another fpecies is defcribed in the *Supplementum* of Linnæus, p. 156, by the name of M. *pinnata*, but this is now referred by Willdenow to *Spondias*, and, as it feems, juftly. See SPONDIAS.

MANGIFERA, in *Gardening*, comprehends a plant of the tree exotic kind for the ftove, of which the fpecies cultivated is the Mango-tree (M. indica.)

There are feveral varieties, none of which are cultivated.

Method of Culture.—As the vegetative property of the feed or nuts of this fpecies of tree does not feem to be long preferved, the readieft method to obtain plants, is to have a quantity of the nuts fet in tubs of earth in the country where they grow naturally, and when the plants are grown a foot high, to have them fhipped, placing a covering over them to defend them from the water and fpray of the fea, being careful not to give them too much water in the paffage. When they arrive in a cold climate, they fhould be fcreened from cold. The plants fhould afterwards be fet in pots filled with light kitchen-garden earth, and be placed in a dry ftove, where, in warm weather, they fhould have frefh air daily, and in winter the air be kept up to temperate, as marked on the botanical thermometer; as they do not fucceed well in the tan-bed of the ftove.

And where the nuts are made ufe of, they fhould be fent over in wax to preferve their vegetative property.

They are alfo capable of being increafed from cuttings, in the manner of gardenia, in this climate.

MANGISCHLAK, in *Geography*, a town on the E. coaft of the Cafpian fea, which is a place of confiderable trade between the Tartars and Ruffians of Aftrachan; 180 miles S.E. of Aftrachan. N. lat. 44° 10'. E. long. 52 14'.

MANGIT, a town of European Turkey, in Beffarabia; 22 miles N.N.E. of Tobak.

MANGLARES, or CORN ISLAND, an ifland in the Spanifh Main, about 15 miles long and five broad; near which is another fmall ifland called "Little Manglares." N. lat. 11° 44'. W. long. 82° 20'.

MANGLE. See LAU[illegible]

MANGLE, or *Mangles*, in *Botany*. See RHIZOPHORA.

MANGLILLA, Juff. 151. A Peruvian fhrub, with the habit of a Cherry-laurel, but with fmall axillary pentandrous flowers, to which Dombey gave the name of *Dubamelia*. It is called *Caballeria* in the *Flora Peruviana*. See MYRSINE, to which genus this plant is referred by Mr. R. Brown.

MA[illegible]NOR, in *Geography*, a town of Norway, in the province of Aggerhuus; 15 miles S. of Konigfwinger.

MANGO, a town of Africa, in the kingdom of Agonna; which fee.—Alfo, a river of Sweden, which runs into the Wenner lake; 10 miles W. of Carlftadt, in the province of Warmeland.

MANGO-*Tree*, in *Botany*. See MANGIFERA.

There are various forts of this fruit, as there are of our apples and pears, which are very different, according to the countries where they grow: that fpecies, which is without a ftone, and is very grateful to the palate, feems to us only a variety or a degenerated fruit; the fruit is cut into flices, and eaten either without wine, or macerated in wine, it is alfo candied, in order to its prefervation; fometimes they open it with a knife, and fill up the middle with frefh ginger, garlick, muftard, and falt, with oil or vinegar, that they may eat it with rice, or after the manner of pickled olives.

As to its temperament, this fruit is cold and moift, though the Indian phyficians affirm the contrary. We make ufe of pickled mangoes which are imported to us, as we do of pickled cucumbers. The ftones roafted are faid to cure a loofenefs, which Garcias found to be true. The wood of the tree, with cinders, is ufed for burning the carcafes of the Pagans, as being confecrated to this rite; whence it ferves alfo for coffins, in which they depofit their dead; it is, however, of a foft fubftance, and of a fhort duration. The ftalks fupply the place of areca, or caunga, in the chewing of betel; the fame, calcined and reduced to powder, take away warts. Of the tender leaves, with the bark of the avanacoe, that is, the ricinus, the feed of cummin and parpaclagam, is made a decoction, which is faid to be highly beneficial in the cough, afthma, and other affections of the thorax. The bark of the tree pulverized, and taken in chicken broth, is an excellent diffolvent of extravafated and coagulated blood, occafioned by a fall, in any part of the body. The juice of the bark, with the white of an egg, and a very little opium, taken inwardly, is a prefent remedy againft the diarrhœa, dyfentery, and tenefmus. Of the gum of the tree, and the flowers of rice, with the addition of a fmall quantity of opium and pepper, are prepared pills, which alfo cure all forts of fluxes of the belly. Of the flour of the dried kernels the natives have the art of preparing various kinds of food. James.

MANGO, in *Ornithology*, a fpecies of *Trochilus*; which fee.

MANGONA, in *Military Language*, formed from a Greek word of the fame import, in the time of the lower empire, was ufed in general to denote all kinds of machines; and *Mangonel* was a diminution, applied to the fmaller machines.

MANGONEGRO, in *Geography*, a market and poft-town of Spain, in the kingdom of Seville, three leagues from Cordova.

MANGONNE, one of the fmaller Friendly iflands. S. lat. 19° 38'. E. long. 185 30'.

MANGOPUNGLY, a town of Hindooftan, in Meywar; 38 miles E. of Cheitore.

MANGOR, a town of Africa, in the kingdom of Kayor.

MANGOSTANA, in *Botany*. See GARCINIA.

MANGOUSTE, in *Zoology*, the *Viverra Mungo*. See VIVERRA and ICHNEUMON.

MANGRABA, in *Geography*, a town of Hindooftan; in Bahar; 55 miles N. of Hajypour.

MANGROLLA, a town of Hindooftan, in Guzerat; 25 miles N.E. of Surat.

MANGROVE, in *Botany*. See RHIZOPHORA.

MANGROVE *Grape*. See COCCOLOBA.

MANGROVE *Ifland*, in *Geography*, a fmall ifland among the Bahamas. N. lat. 26° 12'. W. long. 78° 45'.

MANGROVE *River*, a river of New Zealand, fo called by lieutenant Cook in 1769, on account of the number of mangrove trees about it, which runs into Mercury bay. The fafeft and beft way of failing into this river is to keep the fouth fhore all the way on the board. The country on the E. fide of the river and bay is very barren, its produce being only fern, and a few other plants that will grow in a poor foil. The land on the N.W. fide is covered with wood, and the foil, being much more fertile, will, doubtlefs, produce all the neceffaries of life with proper cultivation. The inhabitants have no plantations; their canoes are mean, and without ornament; they fleep in the open air, and fay, that Taratu, whofe fovereignty they do not acknowledge, if he was to come among them, would kill them. Hence it was inferred, that they were outlaws; though they faid that they had heppahs, or ftrong holds, to which they retired in time of danger. Hawkefworth's Voy. vol. ii.

MANGSCHATE, a town of Silefia, in the principality of Brieg; 8 miles N.E. of Brieg.

MANGULUM, a town of Hindooftan, in Coimbetore; 25 miles S.S.E. of Coimbetore.

MANGUT, a town of Hindooftan, in Baramaul; 28 miles S.S.E. of Darempoor.

MANGUTZKOI, a town of Ruffia, in the government of Irkutfk, on the borders of China; 88 miles W. of Doroninfk. N. lat. 49 40'. E. long. 111° 4'.

MANHEIM, a city of Germany, now belonging to the electorate of Baden, is fituated on a low plain, near the conflux of the Neckar and the Rhine. The old village and citadel of Manheim were converted into a town by the elector Frederic IV. in the year 1606, and adapted to the accommodation of fome Netherlanders, who had quitted their country for the fake of liberty of confcience: and though it was afterwards, *viz.* in 1622, befieged and taken by the Bavarians, and again, *viz.* in 1688, entirely demolifhed by the French, it was re-built by the electors John William and Charles Philip, and fortified in fuch a manner, that it became one of the ftrongeft places in Germany. Its prefent works were formed upon the fyftem of Coehorn. The number of inhabitants, exclufive of the garrifon, was, in 1784, 21,858. Some of the ftreets are planted with rows of trees, and it has five or fix open places, fuitable for promenades or markets. The cuftom-houfe, forming one fide of thefe, is a noble ftone-building, refembling a palace, having under the colonnades that furround it fhops for jewellery and other commodities. The elector's palace opens on one fide to the city, and on the other to the ramparts; it contains a gallery for paintings, and cabinets of antiquities and fubjects of natural hiftory, a library, treafury, and menage. Manheim was taken by the French in 1795, and, in 1802, it was ceded, together with its territory, to the margrave (elector) of Baden. N. lat. 49° 28' 59". E. long. 8° 27' 22".

MANHEIM *School of Mufic*. About the year 1759, the band of the elector palatine in this city, and at Schwetzingen, was regarded as the moft complete and beft difciplined in Europe. We found it to be, indeed, all that its fame had made us expect: power will naturally arife from a great number of hands; but the judicious ufe of that power, on all occafions, muft be the confequence of good difcipline; indeed, there were more folo players and good compofers in this than perhaps in any other orcheftra in Europe; it was an army of generals, equally fit to plan a battle as to fight it.

But it was not merely at the elector's great opera that inftrumental mufic had been fo highly cultivated and refined, but at his concerts, where this extraordinary band had full liberty to difplay all its powers, and to produce great effects without the impropriety of deftroying the greater and more delicate beauties peculiar to vocal mufic; it was here that Stamitz, ftimulated by the productions of Jomelli, firft furpaffed the bounds of common opera overtures, which had hitherto only ferved in the theatre as a kind of court-cryer, with an "O Yes!" in order to awaken attention and befpeak filence at the entrance of the fingers. Since the difcovery which the genius of Stamitz firft made, every effect has been tried which fuch an aggregate of found can produce; it was here that the crefcendo and diminuendo had birth; and the piano, which was before chiefly ufed as an echo, with which it was generally fynonimous, as well as the forte, were found to be mufical colours which had their fhades, as much as red or blue in painting.

In 1772, the band of his electoral highnefs confifted of near a hundred hands and voices. Among whom were Hotzbauer, Canabich, Charles and John Toefchi, Bapt. and Charles Wendling, and the late excellent performer on the violin and leader, Cramer. There were twenty-three vocal performers in this band, among whom Mad. Wendling, Mad. Danzi, afterwards married to Le Brun, a celebrated performer on the hautbois, Mad. Cramer, the mother of the prefent admirable performers now in England, and Alleganti; with the Italian vocal performers, Roncaglio, Pefarini, and Saporofi. His electoral highnefs of that period was himfelf a good performer on the German flute. And the operas

operas executed at Manheim in winter were reprefented in one of the largeft and moft fplendid theatres in Europe, capable of containing 5000 perfons. His electoral highnefs's fuite at Schwetzingen, during fummer, amounted to 1500 perfons, who were all lodged in this little village at his expence. To a ftranger walking through the ftreets of Schwetzingen at this time it muft feem to be inhabited only by a colony of muficians, who are conftantly exercifing their profeffion: at one houfe, a fine player on the violin is heard; at another, a German flute; here an excellent hautbois; there a baffoon, a clarinet, a violoncello, or a concert of feveral inftruments together. Mufic feems to be the chief and moft conftant of his electoral highnefs's amufements; and the operas and concerts, to which all his fubjects have admiffion, form the judgment, and eftablifh a tafte for mufic, throughout the electorate.

MANHEIM, in *Geography*, a town of America, in Pennfylvania, in the county of Lancafter, containing 60 houfes, and 1041 inhabitants, and a Dutch church; 11 miles N. by W. of Lancafter.—Alfo, a town in York county, Pennfylvania, having 1876 inhabitants.

MANI, in *Biography*. See MANICHEES.

MANI, in *Geography*, a town of Africa, in Benguela, on the coaft of the Atlantic; 16 miles S. S. E. of Old Benguela.

MANIA, in *Medicine*. See MENTAL *Derangement*.

MANIACI, in *Geography*, a town of Sicily, in the valley of Demona; 7 miles S.W. of Randazzo.

MANIANA, a country of Africa, fituated S.E. of Bambarra: the inhabitants of which are faid to be cannibals. N. lat. between 13° and 14°. W. long. 1°.

MANIARY, a town of Hindooftan, in Bahar; 22 miles N.E. of Maifey.

MANJAWICK, a town of Hindooftan, in the Carnatic; 30 miles S.E. of Tanjore.

MANJAWLY, a town of Hindooftan, in Oude; 40 miles S.E. of Goorapour. N. lat. 26° 17′. E. long. 84° 13′.

MANICA, a town of Africa, the capital of Chicanga, fituated on the river Sofala, S. lat. 20° 20′. E. long. 28°. —Alfo, a river which rifes in Chicanga, and runs into the Indian fea, S. lat. 25° 30′. E. long. 29° 30′; called alfo "Rio del Lagos," and "Rio del Spiritu Santo."

MANICA, properly a fleeve. See HIPPOCRATES's *fleeve*. Hildanus calls by this name a particular fort of purfe, open at both ends, which he defcribes in his Treatife "De Gangræna et Sphacelo," and gives a figure thereof. This he directs to be put about a limb, juft before the place of amputation, before the operation is performed.

MANICARIA, in *Botany*, fo named by Gærtner, from *manica*, a fleeve, in allufion to the fhape of the *fpatha*, which is like a pouch or bag; whence the older botanifts called the plant in queftion *Palma faccifera*, and Sachel Date. Gærtn. v. 2. 468. t. 176. Willd. v. 4. 493. Lamarck Illuftr. t. 774.—Clafs and order, *Monoecia Polyandria*. Nat. Ord. *Palmæ*, Linn. Juff.

Gen. Ch. *Cal.* Common Sheath pouch-like, pointed at the bafe, interwoven with innumerable fibres, not burfting, widely extenfible, permanent. Stalk bearing male and female flowers, enclofed within the fheath, wand-like, with numerous, fimple, ftraight, compreffed, crowded, notched, toothed, downy, rufty branches.—*Male flowers* very numerous, (above two thoufand,) covering the branches of the ftalk. *Cal.* Perianth of one leaf, fhort, angular, torn, membranous. *Cor.* obovate, triangular, of three equal coriaceous petals. *Stam.* Filaments twenty-four, capillary, diftinct; anthers oblong, furrowed.—*Female flowers* few, fcarcely more than twenty, feffile on the lower part of the branches of the ftalk. *Cal.* Perianth inferior, of one leaf, membranous, thin, obliquely ftriated, crenate and jagged. *Cor.* ovate, pointed, triangular, of three coriaceous petals, four times as large as thofe of the male. *Pift.* Germen fuperior, turbinate, triangular, of three cells; ftyle one, fhort, thick, conical; ftigma fimple. *Peric.* Drupa globofe, acutely tuberculated, dry, of three cells. *Seed.* Nuts folitary, very hard, roundifh, fmooth.

Eff. Ch. Common Sheath pouch-like, fibrous, not burfting.—Male, Calyx of one leaf, torn. Petals three. Stamens twenty-four.—Female, Calyx of one leaf, torn. Petals three. Style one. Drupa fuperior, dry, tuberculated. Nuts three.

1. M. *faccifera*. Sachel Palm. (Palma faccifera; Cluf. Exot 4. Bauh. Hift. v. 1. 383. Ger. em. 1554.)—Native of South America. Clufius fays it was found by fome Dutch failors on a defert ifland in the Atlantic ocean; Gærtner, that it grows in Curaçao and Dutch Guiana. Willdenow feems wrong in confidering it a native of the Eaft Indies. Of the *tree* itfelf, or its foliage, nothing is known. The *fpatha* is occafionally feen in the mufeums of the curious, and refembles a fort of netted fibrous bag, from two to four feet long, containing numerous, globular, three-celled *fruits*, the fize of a large cherry, or fmall walnut, whofe outfide is ftrongly muricated with fharp, prominent, unequal tubercles. Gærtner had not feen the fruit in an advanced ftate, or he would not have fufpected that it could be the fame as his *Coccos lapidea*, t. 6. f. 1.—We do not find the nuts fo very hard as Clufius defcribes them, and therefore conclude our fpecimen to be but about half ripe. The coat of the drupa is of a corky fubftance, but denfely fibrous, and is divided internally into three cells, each containing one nut, whofe fhell is fmooth and brittle. One of the cells is occafionally abortive. Of the kernel we can determine nothing, it being but half formed.

MANICHEES, or MANICHEANS, MANICHÆI, in *Ecclefiaftical Hiftory*, a fect of ancient heretics, who afferted two principles; fo called from their author *Manes*, *Mani*, or *Manichæus*, a Perfian by nation, and educated among the Magi, being himfelf one of that number before he embraced Chriftianity. See MAGI.

This herefy had its firft rife about the year 277, and fpread itfelf principally in Arabia, Egypt, and Africa. Dr. Lardner, after having examined many authorities, with regard to the rife of Manicheeifm, both in Perfia and in the Roman empire, concludes with expreffing his doubt whether it was known in the Roman empire before the very end of the third century, or the beginning of the fourth. St. Epiphanius, who treats of it at large, obferves, that the true name of this herefiarch was Cubricus; and that he changed it for *Manes*; which, in the Perfian or Babylonifh language, fignifies *veffel*. A rich widow, whofe fervant he had been, dying without iffue, left him ftore of wealth; after which he affumed the title of the apoftle or envoy of Jefus Chrift.

We fhall here fubjoin fome additional circumftances relating to this herefiarch. Mani, always fo called by the Perfians and Arabians, and ufually denominated Manes, or Manichee, by the Greeks and Romans, was a Perfian, or at leaft lived in the territories of the king of Perfia. This is allowed by all thofe authors who fpeak of him. Cave and Tollius derive his name from the Greek noun "mania," fignifying madnefs, intimating that his name was the fame as "Maneis," *i. e.* mad or furious; whereas the name is certainly Perfic or Chaldaic. Cyril of Jerufalem fays, that he changed his name from Cubricus to Manes, thinking by fo doing to gain honour among the Perfians, but

but divine providence fo ordered it, that he thereby affixed to himfelf among the Greeks the character of madnefs. Beaufobre obferves, that whatever was the meaning of the name, it certainly was very honourable; and if it fignified any thing, it denoted fome advantageous quality; for divers kings of Edeffa were named Manes, or Maanes; and Affemann fays, that it was a common name of the princes of Syria and Arabia. The Greek writers continually reprefent Mani as a flave, purchafed by a widow, and afterwards fet at liberty. This widow, it is faid, adopted him for her fon, gave him a good education, and at length made him her heir. It has been doubted, however, whether Mani was ever a flave, as no notice is taken of this circumftance by the eaftern writers: and even the Greek authors fpeak of him as rich, learned, educated among philofophers, and at the court of Perfia in his early age. Manes, among the Greeks, was a common name for flaves; and hence it has been conjectured originated the common opinion of the Greek writers concerning Mani's fervitude. The eaftern authors, cited by Hyde and Herbelot, fay that Mani was by profeffion a painter and engraver; that he had fo fine a hand as to draw lines and make circles without rule or compafs, and that he made a terreftrial globe with all its circles and divifions. It is alfo faid that he was fkilled in aftronomy, and that he wrote a book of aftrology. It is probable, according to Beaufobre, that Mani believed our earth to have two hemifpheres, an upper and a lower, both inhabited; and, confequently, that there are antipodes. He is reprefented as a learned man and a philofopher, and it is faid that he wrote a fyftem of philofophy, and invented a mufical inftrument, called by the Arabians "Oud." That he was learned appears from various circumftances already recited.

Mani was not contented with the quality of apoftle of Jefus Chrift, but he alfo affumed that of the Paraclete, whom Chrift had promifed to fend: which Auguftin explains, by faying, that Mani endeavoured to perfuade men, that the Holy Ghoft did perfonally dwell in him with full authority. He left feveral difciples, and, among others, Addas, Thomas, and Hermas. Thefe he fent, in his lifetime, into feveral provinces to preach his doctrine. Mani, having undertaken to cure the king of Perfia's fon, and not fucceeding, was put in prifon upon the young prince's death, whence he made his efcape; but he was apprehended foon after, and flayed alive. Beaufobre gives no credit to the ftory of his attempt to cure the king of Perfia's fon.

The oriental writers, cited by D'Herbelot and Hyde, tell us, that Mani, having gained fome efteem, began to gather together a number of people in the character of difciples, who oppofed the worfhip and ceremonies of the religion of Zoroafter, profeffed at that time by the Perfians. Sapor, on this account and the fubfequent difturbances, would have had him punifhed, but Mani, perceiving his danger, fled into Turkeftan, where he had full opportunity to propagate his opinions, and where he was regarded as a wonderful man, and even a god. Here it is faid he lodged for a year in a cave, where he framed an impofture that multiplied the number of his followers, who all went from Turkeftan into Perfia upon the death of Sapor. Mani was protected in a fingular manner by Hormizdas, who fucceeded Sapor in the Perfian throne, but he was unable to defend him, at length, againft the united hatred of the Chriftians, the Magi, the Jews, and the Pagans: he was fhut up in a ftrong caftle, to ferve him as a refuge againft thofe who perfecuted him on account of his doctrine. Thefe writers add, that, after the death of Hormizdas, Varanes I. his fucceffor, firft protected Mani, but afterwards gave him up to the fury of the Magi, whofe refentment againft him was due to his having adopted the Sadducean principles, as fome fay; while others attribute it to his having mingled the tenets of the Magi with the doctrines of Chriftianity. Varanes having at firft fuccoured him, afterwards brought him out of his caftle under a pretence of difputing with the doctors of the Zoroaftrian fect, flayed him alive, filled his fkin with chaff, and had it hung up in a confpicuous place to terrify thofe of his fect; upon which moft of his followers fled into India, and fome even to China. All who remained in Perfia loft their liberty, and were reduced to fervitude. It is generally reported, both by the Eaftern and Greek writers, that Mani was put to death by a king of Perfia; but they feem to have no knowledge of the death of the king of Perfia's fon; and it is certain that the Manicheans celebrated the day of their mafter's death, which is generally fuppofed to have happened in the year 278.

It has been a fubject of much controverfy, whether Mani was an impoftor who pretended to prophecy and infpiration. The learned Dr. Lardner has examined the arguments on both fides; and though he does not choofe to deny that he was an impoftor, he does not difcern evident proofs of it. He acknowledges that he was an arrogant philofopher, and a great fchemift; but whether he was an impoftor he cannot certainly fay. He was much too fond of philofophical notions, which he endeavoured to bring into religion, for which he is to be blamed: neverthelefs, he obferves, that every bold dogmatifer is not an impoftor. Lardner allows that Mani and his followers were Chriftians, and held many opinions in common with other Chriftians.

The doctrine of Mani, fays Mofheim, was a motley mixture of the tenets of Chriftianity with the ancient philofophy of the Perfians, in which he had been inftructed during his youth. He combined thefe two fyftems, and applied and accommodated to Jefus Chrift the characters and actions which the Perfians attributed to the god Mithras.

He eftablifhed two principles, *viz.* a good and an evil one: the firft a moft pure and fubtile matter, which he called *light*, did nothing but good; and the fecond, a grofs and corrupt fubftance, which he called *darknefs*, nothing but evil. This philofophy is very ancient; and Plutarch treats of it at large in his Ifis and Ofiris.

Our fouls, according to Mani, were made by the good principle, and our bodies by the evil one; thofe two principles being, according to him, co-eternal, and independent of each other. In this notion, according to St. Auguftin, his followers triumphed to a great degree, fuppofing that it afforded the beft account of the origin of evil. Each of thefe principles is fubject to the dominion of a fuperintending being, whofe exiftence is from all eternity. The being who prefides over the light is called God; he that rules the land of darknefs bears the title of hyle, or demon. The ruler of the light is fupremely happy, and, in confequence thereof, benevolent and good: the prince of darknefs is unhappy in himfelf, and defirous of rendering others partakers of his mifery, and is evil and malignant. Thefe two beings have produced an immenfe multitude of creatures, refembling themfelves, and diftributed them through their refpective provinces. After a conteft between the ruler of light and the prince of darknefs, in which the latter was defeated, this prince of darknefs produced the firft parents of the human race. The beings, engendered from this original ftock, confift of a body formed out of the corrupt matter of the kingdom of darknefs, and of two fouls, one of which is fenfitive and luftful, and owes its exiftence to the evil principle;

principle; the other rational and immortal, a particle of that divine light, which had been carried away in the conteft by the army of darknefs, and immerfed into the mafs of malignant matter. The earth was created by God, out of this corrupt mafs of matter, in order to be a dwelling for the human race, that their captive fouls might, by degrees, be delivered from their corporeal prifons, and their celeftial elements extracted from the grofs fubftance in which they were involved. With this view God produced two beings from his own fubftance, *viz.* Chrift, and the Holy Ghoft: for the Manicheans held a confubftantial Trinity. Chrift, or the glorious intelligence, called by the Perfians Mithras, fubfifting in and by himfelf, and refiding in the fun, appeared in due time among the Jews, clothed with the fhadowy form of a human body, to difengage the rational foul from the corrupt body, and to conquer the violence of malignant matter, and he demonftrated his divine miffion by ftupendous miracles. The Jews, incited by the prince of darknefs, put him to an ignominious death, which he fuffered not in reality, but only in appearance, and according to the opinion of men. When the purpofes of Chrift were accomplifhed, he returned to his throne in the fun, appointing apoftles to propagate his religion, and leaving his followers the promife of the Paraclete or Comforter, who is Mani, the Perfian. Thofe fouls who believe Jefus Chrift to be the fon of God, renounce the worfhip of the god of the Jews, who is the prince of darknefs, and obey the laws delivered by Chrift, and illuftrated by Mani, the comforter, are gradually purified from the contagion of matter; and their purification being completed, after having paffed through two ftates of trial, by water and fire, firft in the moon and then in the fun, their bodies return to their original mafs; for the Manicheans derided the refurrection of bodies; and their fouls afcend to the regions of light. But the fouls of thofe who have neglected the falutary work of purification, pafs, after death, into the bodies of other animals, or natures, where they remain till they have accomplifhed their probation. Some, however, more perverfe and obftinate, are configned to a feverer courfe of trial, being delivered over, for a time, to the power of malignant aerial fpirits, who torment them in various ways. After this, a fire fhall break forth and confume the frame of the world: and the prince and powers of darknefs fhall return to their primitive feats of anguifh and mifery, in which they fhall dwell for ever. Thefe manfions fhall be furrounded by an invincible guard, to prevent their ever renewing a war in the regions of light.

Mani borrowed many things from the ancient Gnoftics; on which account, many authors confider the Manicheans as a branch of the Gnoftics.

In truth, the Manichean doctrine was a fyftem of philofophy rather than of religion. They made ufe of amulets, in imitation of the Bafilidians; and are faid to have made profeffion of aftronomy and aftrology. They denied that Jefus Chrift, who was only God, affumed a true human body, and maintained it was only imaginary: and, therefore, they denied his incarnation, death, &c. They pretended that the law of Mofes did not come from God, or the good principle, but from the evil one; and that for this reafon it was abrogated. They rejected almoft all the facred books, in which Chriftians look for the fublime truths of their holy religion. They affirmed, that the Old Teftament was not the work of God, but of the prince of darknefs, who was fubftituted by the Jews in the place of the true God. They abftained entirely from eating the flefh of any animal; following herein the doctrine of the ancient Pythagoreans: they alfo condemned marriage. The reft of their errors may be feen in St. Epiphanius and St. Auguftin; which laft, having been of their fect, may be prefumed to have been thoroughly acquainted with them.

Though the Manichees profeffed to receive the books of the New Teftament, yet, in effect, they only took fo much of them as fuited with their own opinions. They firft formed to themfelves a certain idea or fcheme of Chriftianity, and to this adjufted the writings of the apoftles; pretending that whatever was inconfiftent with this, had been foifted into the New Teftament by later writers, who were half Jews. On the other hand, they made fables and apocryphal books pafs for apoftolical writings; and even are fufpected to have forged feveral others, the better to maintain their errors. St. Epiphanius gives a catalogue of feveral pieces publifhed by Mani, and adds extracts out of fome of them. Thefe are the Myfteries, Chapters, Gofpel, and Treafury.

The rule of life and manners which Mani prefcribed to his followers, was moft extravagantly rigorous and fevere. However, he divided his difciples into two claffes; one of which comprehended the perfect Chriftians, under the name of the *elect*; and the other, the imperfect and feeble, under the title of *auditors* or *hearers*. The *elect* were obliged to a rigorous and entire abftinence from flefh, eggs, milk, fifh, wine, all intoxicating drink, wedlock, and all amorous gratifications; and to live in a ftate of the fevereft penury, nourifhing their emaciated bodies with bread, herbs, pulfe, and melons, and depriving themfelves of all the comforts that arife from the moderate indulgence of natural paffions, and alfo from a variety of innocent and agreeable purfuits. The *auditors* were allowed to poffefs houfes, lands, and wealth, to feed on flefh, to enter into the bonds of conjugal tendernefs; but this liberty was granted them with many limitations, and under the tricteft conditions of moderation and temperance. The general affembly of the Manicheans was headed by a prefident, who reprefented Jefus Chrift. There was joined to him twelve rulers or mafters, who were defigned to reprefent the twelve apoftles, and thefe were followed by feventy-two bifhops, the images of the feventy-two difciples of our Lord. Thefe bifhops had prefbyters or deacons under them, and all the members of thefe religious orders were chofen out of the clafs of the elect. Their worfhip was fimple and plain; and confifted of prayers, reading the fcriptures, and hearing public difcourfes, at which both the auditors and elect were allowed to be prefent. They alfo obferved the Chriftian appointments of baptifm of infants and the eucharift, communicating frequently in both kinds. They kept the Lord's day, obferving it as a faft; and they likewife kept Eafter and Pentecoft.

Towards the fourth century, the Manicheans concealed themfelves under various names, which they fucceffively adopted, and changed in proportion as they were difcovered by them. Thus they affumed the names of Encratites, Apotactics, Saccophori, Hydroparaftates, Solitaries, and feveral others, under which they lay concealed for a certain time, but could not, however, long efcape the vigilance of their enemies. About the clofe of the fixth century, this fect gained a very confiderable influence, particularly among the Perfians.

Towards the middle of the twelfth century the fect of Manichees took a new face, on occafion of one Conftantine, an American, and an adherer to it; who took upon him to fupprefs the reading of all other books befides the Evangelifts, and the Epiftles of St. Paul, which he explained in fuch a manner as to make them contain a new fyftem of Manicheifm. He entirely difcarded all the writings of his predeceffors;

predeceffors; rejecting the chimæras of the Valentinians, and their thirty æons; the fable of Manes, with regard to the origin of rain, and other dreams; but ftill retained the impurities of Bafilides. In this manner he reformed Manicheifm, infomuch that his followers made no fcruple of anathematizing Scythian, Buddas, called alfo Addas and Terebinth, the contemporaries and difciples, as fome fay, and according to others, the predeceffors and mafters of Manes, and even Manes himfelf, Conftantine being now their great apoftle. After he had feduced an infinite number of people, he was at laft ftoned by order of the emperor.

This fect prevailed in Bofnia and the adjacent provinces, about the clofe of the fifteenth century; propagated their doctrines with confidence, and held their religious affemblies with impunity. See on the fubject of this article, Mofheim's Eccl. Hift. vol. i. p. 295, &c. 8vo. edit.; Lardner's Works, vol. iii.; and Bayle, art. *Manichees*.

MANICHORD, or Manichordion, a mufical keyed-inftrument, in the form of a fmall pianoforte. See Clavichord.

MANICKDURG, in *Geography*, a town of Hindooftan, in Berar; 5 miles S.E. of Chanda. N. lat. 19° 59'. E. long. 79 59.

MANICKPATAM, a town of Hindooftan, in the province of Cattack; 50 miles S. of Cattack.

MANICKPOUR, a circar of Oude, bounded N.E. by Oude proper, S.E. by Jionpour, S. by Allahabad S.W. by Currah and Corah, and N.W. by Lucknow; about 60 miles long, and 40 broad.—Alfo, the capital of the above circar; 30 miles N.W. of Allahabad. N. lat. 25 50'. E. long 81 40'.

MANICKRAJE, a town of Bengal; 42 miles S.S.E. of Dacca.

MANICOU, in *Zoology*. See Opossum.

MANICOUAGAN, or Black-river, in *Geography*, a river of Canada, which runs into the river St. Lawrence, near Manicouagan point, which is a cape on the north coaft of the river. N. lat. 49° 12'. W. long. 67° 50'.

Manicouagan, a lake of Canada; 300 miles N.E. from Quebec. N. lat. 56 20'. W. long. 66 45'.

MANICUM Strychnum, in *Botany*, a term ufed by the old Greek writers to exprefs a kind of nightfhade, which, when taken internally, caufed madnefs. Pliny, defcribing this fpecies, fays that it has leaves like the ocymum or bafil; and Theophraftus and Diofcorides fay it had leaves like the eruca or rocket. Where Pliny had his information is not eafy to guefs, for he commonly copies from thefe authors: they are, however, much more to be depended on; and as the leaves of the ocymum or bafil are not at all like thofe of the rocket, Pliny is certainly wrong in his account; and the moft probable reafon for his error is that he miftook the Greek name of the plant, to which thefe authors compared the leaves of the manicum ftrychnum, and tranflated *euzomon*, which is the name of the rocket, into ocymum, bafil; a name fomewhat like the Greek one in found, but wholly different in fignification; the two plants bafil and rocket not only having leaves very unlike one another, but being alfo of different genera. A yet greater error of Pliny, in regard to this plant, is his placing it among the efculent garden herbs, and faying that it was in ufe as a food, immediately after he had told us of its caufing madnefs in thofe who eat it. This is an evident confufion of the maniac folanum with the pomum amoris or love apple, the fruit of which is eaten in foups at this time.

MANJEAH, in *Geography*, a town of Hindooftan, in Bahar, on the Soane; 18 miles S. of Rotafgur. N. lat. 24° 20'. E. long. 83° 57'.

MANIEN, a fmall ifland in the Pacific ocean, near the coaft of Chili. S. lat. 45°.

MANIERA, *Ital.*, *Manner*, a mufical term to exprefs a good or bad ftyle of finging. In fpeaking of an individual performer, when it is faid, "à una bella maniera," it implies that fuch performer, male or female, fings in good tafte, in an elegant manner.

MANIFEST, in *Commerce*, a paper containing the particulars of a fhip and cargo; which paper muft be figned by the mafter of the veffel, before any of the goods can be landed.

MANIFESTO, an apology, or public declaration in writing, made by a prince, fhewing his intentions in any enterprize, the motives that induced him to it, and the reafons on which his right and pretenfions are founded.

MANIFOLD, Cape, in *Geography*, a point of land on the coaft of New Holland, or New South Wales, fo called by Cook in 1770, from the number of high hills which appeared over it; lying in S. lat. 22 43, and diftant about 17 leagues from cape Capricorn, in W. long. 208 58'. Between thefe two capes lies a large bay, called "Keppel bay;" which fee.

MANJHA, a town of Hindooftan, in Bundelcund; 60 miles S of Chatterpour.

MANIHOT, in *Botany*, an Indian name for the root of which Caffava bread is made. (See Jatropha *Manihot.*) The *Hibifcus Manihot* feems to have been fo named from the refemblance of its leaves to that plant, not from any fimilar ufe or quality.

MANILIA, in *Geography*, a town of South America, in the province of Tucuman; 30 miles E.S.E. of Rioja.

MANILIUS, Marcus, in *Biography*, a Latin poet, known only by his work, from which it fhould feem that he wrote in the reign of Auguftus, after the defeat of Varus, and that he was, if not a native of Rome, at leaft a Roman fubject. This poem is entitled "Aftronomicon," treating, in five books, upon the fixed ftars: a fixth appears to have related to the planets, but this is entirely loft. It unites the ancient fyftem of aftronomy with the philofophy of the Stoics: there are paffages in it which would not difgrace any poet of the Auguftan age. The work has been elucidated by fome very confiderable critics. Jofeph Scaliger publifhed an edition of it at Paris in 1579, and one at Leyden in 1600. The edition of our countryman Bentley, in 1739, is in high efteem. Thofe of Stoeber, cum notis variorum, and of Pingrè, with a French tranflation, are much valued. Creech gave a tranflation of Manilius in Englifh verfe. The poem was difcovered by the learned Poggius, in the fixteenth century.

MANILLA, in *Geography*, the capital city of Luçon, and alfo of the Spanifh fettlements in the Philippine iflands. In compafs it is about two miles; its length being about two-thirds of a mile; of an irregular form, narrow at both ends, and wide in the middle. It is well built; its ftreets are broad; its houfes, though conftructed of timber above the firft floor, are handfome, and rendered beautiful by their galleries; and its churches are magnificent. It is a fortified city, and fituated on the fouth-weft coaft, in a moft advantageous pofition, on the banks of a confiderable river, which wafhes its walls, and whofe divided branches completely traverfe the whole ifland. A third part of this city is occupied by convents; and the number of its Chriftian inhabitants is computed at 12,000. The fuburbs extend to a confiderable diftance beyond the walls. Within a mufket-fhot of the gate of Parian is the habitation of Chinefe merchants, called Sangleys, whose shops in several streets are furnished for sale with silk, porcelain, and other commodities. The number of persons, who availing themselves of the indolence of the Spaniards and Indians, profitably employ themselves in this way, is very considerable. These Sangleys are under the government of an alcaide, to whom, as well as to other officers, they allow handsome salaries. Beyond the bridge adjoining to Parian are fifteen suburbs or hamlets, inhabited by Japanese, Tagalis, and people of other nations, under the government of an alcaide. Their houses, constructed of wood, are situated near the river, and erected on pillars: the roofs are covered with palm-tree leaves, and the sides formed of canes; and they are ascended by ladders, as the ground is moist, or sometimes overflowed with water. The castle stands at the west end of the city, having the sea on one side, and the river on the other.

We shall here subjoin some additional particulars relating to Manilla and its suburbs, extracted from the first volume of the Travels of Pages, who resided some months in the island of Luçon or Luconia. The river, which flows under the city walls, is the harbour for merchant ships, and separates Manilla from the town of St. Croix. This latter town is in part equally well built with the capital, is populous in Indians and Spaniards, and is surrounded by three villages of the natives, which may be regarded as suburbs. At a short distance, on the opposite bank of the river, but on the same side with Manilla, are several considerable towns also belonging to the natives. Few merchants, and still fewer mechanics, reside within the walls of Manilla. The great seat of their manufactures, as well as the emporium of all kinds of merchandise, is the town named "Parian," on the other side of the river, which is pretty regularly built, and inhabited chiefly by Chinese. From a small colony, the population of these people has increased so as now to amount to more than 20,000, who, after engrossing the whole of the manufactures, and the principal part of the trade of Manilla, began to turn their attention to agriculture. Possessed of a considerable degree of art and address, they are sober, industrious, affable, and lively.

Among the inhabitants of Manilla are Armenian merchants, Malays, natives of the Malabar coast, and of the kingdom of Siam, and also a few Japanese.

Articles of beautiful workmanship in gold, and a species of metal named tombac, which is esteemed one-third more precious, are manufactured by the artists of Manilla; and the gold chains, made by their women, vie in beauty with the most elegant that are wrought in any part of the world.

In the year 1645, a great part of this city was destroyed by an earthquake, and 3000 persons perished in the ruins. The country surrounding this city is extremely fertile, and capable of any kind of cultivation; but the inhabitants have profited neither by the situation of the city, nor the fertility of its environs. The entrance of the river is obstructed by a bar, which is dangerous, with a rough sea; but no effectual labour has been undertaken for removing it. The soil is left uncultivated; and the law, by prohibiting exportation, discourages every attempt for increasing its produce. The consequence of this neglect has been occasional famine, when rains, or drought, or hurricanes, render the fecundity of the earth useless. The inhabitants, thus indolent in improving their natural means of wealth, direct their views and hopes towards the galleon, which sails every year for Acapulco. Formerly, a celebrated commerce was carried on between Manilla and this last-mentioned city, nearly in the same parallel on the west of Mexico, through a space of about 140°, or more than one-third of the circumference of the globe. The Manilla ships, called *galleons* (which see), were then of large size; but at a later period, smaller vessels have been employed in this trade. The return of the galleon, or other vessels, was valued every year at Manilla at three millions of piastres, which were soon expended in merchandise, generally purchased of an English vessel under American colours. But this kind of traffic, as Sonnerat states it, is a real loss to the inhabitants. On the one hand, they buy their merchandise at an exorbitant price; and on the other, they strip themselves of all the silver which enters their island. This writer adds, "the force of habit, the convenience of trafficking with gold instead of merchandise, which is necessarily accompanied with some trouble, makes them prefer trading in money with the English vessels to the commerce with ships from the isle of France, which would take in exchange the productions of their country, cordage, pitch, tar, cloth, sugar, oil, reeds, canes, indigo, cocoa, &c. which would be a commerce equally advantageous to both nations."

The bay of Manilla, says M. de la Perouse, is open to ships of every size, but can be defended only by men of war: any expedition, therefore, against this colony, presupposes a decided superiority of naval force. The fortifications of the place, though regular and perfectly well kept up, could only retard for a few days the surrender of a city, which cannot expect succours either from Europe, or from any other quarter. The garrison is composed of only one regiment of mulattoes. The corps of artillery, consisting of 200 men, as well as the 150 dragoons, are also Americans; and yet Perouse says, that he should not fear with 1500 men successfully to attack 3000 of them. "Upon the whole," he says, "the conquest of Manilla appears to me so easy, and so certain, with a superiority of naval force, and 5000 troops, I might answer for its success."

The city of Manilla was taken by the English in 1762; and the ransom of a million sterling remained unpaid. The Chinese, as we have already stated, were numerous in this city, till the beginning of the seventeenth century, when the Spaniards committed a dreadful massacre of these industrious people. In 1769, it is said that they were again expelled from all these isles by the bigotry of the governor: since which time there has been a great decline in industry and produce. N. lat. 14° 36′ 8″. E. long. 120° 51′ 15″. See Luçon and Philippines.

Manilla, a town of Hindoostan, in Mysore; 14 miles W. of Tademeri.

MANILLE, or Menille, in *Commerce*, one of the principal commodities carried by the Europeans to the coasts of Africa, to traffic with the Negroes in exchange for slaves. It is a large brass ring in form of a bracelet, either flat or round, plain or engraven; with which the natives used to deck themselves, putting them on the small of the leg, and the thick of the arm above the elbow.

The better sort among the Negroes wear silver and gold manilles; but these were of their own manufacture; most of the money they receive for their own merchandise being melted into manilles.

MANILLON, in *Geography*, a township of America, in Fayette county, Pennsylvania, containing 1207 inhabitants.

MANILVA, a town of Spain, not far from the route from Malaga to Gibraltar, situated across the mountains from Guayaro, and belonging to the house of Arcos. It is surrounded with vineyards, which produce an exquisite rich wine, known by the name of Manilva wine.

MANIMBODU, a town of Hindoostan, in the Carnatic; 15 miles S.W. of Pondicherry.

MANIMUNGALUM, a town of Hindooſtan, in the Carnatic; 16 miles S. W. of Madras.

MANINGEABO. See MENANGEABOW.

MANINGTREE, or MANNINGTREE, a ſmall irregular town in the hundred of Tendring, and county of Eſſex, England, is ſituated on the ſouthern banks of the river Stour, nine miles diſtant from Colcheſter, and 61 from London: though only a chapelry to the pariſh of Miſtley, it has the privilege of a market. Whence it derived its preſent name is uncertain: its ancient appellation was Sciddinchou, by which it is mentioned in Domeſday book, as being then held by Adeliza, counteſs of Albemarle, and half ſiſter to the Conqueror. It afterwards became the property of Maud de Clare, counteſs of Hereford and Glouceſter, who beſtowed the manor on the nunnery of the order of St. Auguſtine, at Canon-Lugh, in Devonſhire. After the diſſolution, Manningtree (called in the grant Many-tree, alias Scidinghoo) was given by Henry VIII. to ſir John Rainſworth. In the certificate of chantry lands it is called "a great towne, and alſo a haven towne, having in yt to the number of 700 howſeling people." In the year 1801, the population, as aſcertained under the act of parliament, was 1016, occupying 129 houſes, 953 of the inhabitants were returned as being employed in various trades and manufactures. The market is kept on Thurſdays; and an annual fair on the Thurſday in Whitſun week. The river Stour was made navigable from this town to Sudbury in Suffolk, by an act paſſed in the fifth year of queen Anne. The principal imports are deals, corn, coals, iron, and fiſh. Beauties of England and Wales, vol. iv.

MANIPA, one of the ſmaller Molucca iſlands, about 2500 toiſes in extent from N. to S. Although this iſland is very mountainous, it is populous, and contains about 1600 inhabitants; and many canoes ply along its ſhore: five or ſix leagues W. from Ceram. S. lat. 3° 21′. E. long. 127° 54′. —Alſo, a river on the W. coaſt of Celebes, which runs into the ſea, S. lat. 3° 12′.

MANIPULATION, a term uſed in the mines, to ſignify the manner of digging the ſilver, &c. out of the earth.

MANIPULUS, MANIPULE, among the Romans, was a little body of infantry, which, in the time of Romulus, conſiſted of a hundred men, and in the time of the conſuls and firſt Cæſars, of two hundred.

The word properly ſignifies a handful; and, according to ſome authors, was firſt given to the handful of hay which they bore at the end of a pole, to diſtinguiſh themſelves by, before the cuſtom was introduced of bearing an eagle for their enſign; and hence alſo the phraſe, a handful of men. But Vegetius, Modeſtus, and Varro, give other etymologies of the word: the laſt derives it from *manus*, a little body of men following the ſame ſtandard. According to the former, this corps was called *manipulus*, becauſe they fought hand in hand, or all together: "Contubernium autem manipulus vocabatur ab eo, quod conjunctis manibus pariter dimicabant."

Each manipule had two centurions, or captains, called *manipularii*, to command it; one whereof was lieutenant to the other. Each cohort was divided into three manipules, and each manipule into two centuries.

Aulus Gellius quotes an old author, one Cincius, who lived in the time of Hannibal (whoſe priſoner he was), and who, writing on the art of war, obſerves, that then each legion conſiſted of ſixty centuries, of thirty manipules, and of ten cohorts. And again, Varro and Vegetius mention it as the leaſt diviſion in the army, only conſiſting of the tenth part of a century; and Spartian adds, that it contained no more than ten men. This ſhews that the manipulus was not always the ſame thing. See LEGION.

MANIPULUS is alſo an eccleſiaſtical ornament, worn by the prieſts, deacons, and ſub-deacons, in the Romiſh church. It conſiſts of a little fillet in form of a ſtole, three or four inches broad, and made of the ſame ſtuff with the chaſuble; ſignifying and repreſenting an handkerchief, which the prieſts in the primitive church wore on the arm, to wipe off the tears they were continually ſhedding for the ſins of the people. There ſtill remains a mark of this uſage in a prayer rehearſed by thoſe who wear it; "Merear, Domine, portare manipulum fletus & doloris."

The Greeks and Maronites wear two manipules, one on each arm.

MANIPULUS, in *Phyſic*, denotes a meaſure, or fixed quantity, of herbs, or leaves, *viz.* a handful; or ſo much as the whole hand can graſp: it is generally marked in preſcription, with an *M.*

MANIQUE, in the *Materia Medica*, the name given by authors to an American root, commended greatly for curing tertian and quartan agues, and as an infallible remedy againſt venomous bites. Redi procured ſome of this famous root, and gave it many very fair trials, but could never diſcover any of theſe virtues in it.

MANIS, in *Natural Hiſtory*, a genus of quadrupeds the claſs Mammalia, and order Bruta, of which there are, according to Gmelin, two ſpecies, but Dr. Shaw mentions three. The generic character is, that it has no teeth; the tongue is round, and extenſile; the mouth is narrowed into a ſnout; the body is covered above with moveable bony ſcales.

This genus preſents an appearance as extraordinary as that of the Daſypus, being covered on every part, except the belly, with ſtrong and large ſcales, conſtituting a complete ſuit of armour, capable of defending the animals, when rolled up, from the aſſaults of the moſt ferocious enemies. This covering, together with the length of the body and tail, gives an aſpect ſo much reſembling that of a lizard, that the creatures of the genus are commonly known by the name of the ſcaly lizards, though they are in no other reſpects allied to the lizard tribe than in their covering. They are, however, admitted to form a ſort of link of approximation between the proper viviparous quadrupeds and the lizards. In their nature they are harmleſs, and feed in the ſame manner as the ant-eaters, by thruſting out their very long tongue into the neſts of ants and other inſects, and ſwallowing their prey, by ſuddenly drawing it back. They are found chiefly in India and the India iſlands.

Species.

PENTADACTYLA, five-toed or ſhort-tailed manis. The tail in this ſpecies is not ſo long as the body, it is very thick at the baſe, and from thence gradually tapering, but ending obtuſely. The head is ſmall, and the ears are likewiſe ſmall and rounded. The feet are furniſhed with five toes each, of which thoſe on the fore-feet are extremely ſtrong, except the exterior one, which is much ſmaller than the reſt. The whole animal is covered with thick, ſtrong, and large ſcales, which, when full grown, are perfectly ſmooth, but in thoſe which are ſmaller, they are ſtriated about half way from the baſe. They are channelled at the baſe, but at the edges they are ſharp, rounded, and imbricate. It inhabits Guinea, China, and India. The colour of the animal is of a pale yellow-brown, and the ſurface is gloſſy. It meaſures, including the tail, from ſix to eight feet in length. In Bengal, it has obtained the name of the "Thunderbult Reptile." from the hardneſs of its ſcales, which are ſaid to be capable of of ſtriking fire like a flint. It lives in woods and marſhy places, and feeds on ants, by laying its long tongue acroſs their paths. It walks ſlowly, and when purſued, rolls itſelf up, and is then ſo ſecurely armed, that even a leopard attacks it in vain. It is ſaid to be capable of deſtroying the elephant, by twiſting itſelf round the trunk, and thus compreſſing that tender and ſenſible organ with its hard ſcales.

Tetradactyla, four-toed or long-tailed manis. This animal is leſs than that already deſcribed; it is found in India; the ſcales are much channelled, each is armed with three points; the under parts are covered with hair, and the tail is three times as long as the body. The legs are very ſhort, and ſcaled like the body, and on each of the feet are four claws, of which thoſe on the fore-feet are ſtronger than thoſe on the hind. The colour is an uniform deep brown, with a yellowiſh caſt, and with a gloſſy or poliſhed ſurface. From the tip of the noſe to the extremity of the tail, its whole length is about five feet.

Latissima, or broad-tailed manis, is denominated, in the ſixtieth volume of the Philoſophical Tranſactions, in which there is a figure of the animal, the "New Manis." The creature here deſcribed was killed in the houſe of a merchant at Tranquebar, having been diſcovered in the cavity of a wall. When attacked it rolled itſelf up in ſuch a manner as to leave only the back and tail viſible, ſo that it was deſtroyed with much difficulty. It had five toes on the fore-feet, and four on the hind; the ſcales were of the ſhape of a muſcle; the belly quite ſmooth; the exterior ſcales ended in a ſharp point, ſomewhat incurvated; the tail was very broad, decreaſing to a point. It is doubtful, after all, whether this animal belongs to a diſtinct ſpecies, or whether it be a variety of one of thoſe already noticed. "In reality," ſays Dr. Shaw, "the differences do not ſeem ſufficient to conſtitute a ſpecific diſtinction, and are, probably, owing to the differences of age and ſex. In the Britiſh Muſeum there are ſpecimens of different ſizes, which ſhew theſe gradations. In one, the ſcales, all over the animal, are ſo regularly and completely truncated at the extremity, as to exhibit the appearance of ſo many hexagons. In another they are remarkably broad and rounded; and in a third, which is a very large ſpecimen, they are leſs obtuſe at the tips, and ſomewhat irregularly terminated, as if notched, or worn through age. The proportional breadth of the tail alſo varies ſomewhat in theſe ſpecimens, and ſeems greateſt in thoſe which are the leaſt advanced in age."

MANISSA, in *Geography*, a river of Africa, forming the ſouthern boundary of Inhambane, and running into the Indian ſea, S. lat. 25° 50′.

MANISTIE, a river of Canada, which runs into lake Michigan, N. lat. 45° 36′. W. long. 85° 40′.

MANISURIS, in *Botany*, a graſs moſt aptly ſo named by Linnæus, from *Manis*, the Scaly Lizard, and οὐρά, *a tail*, the ſingular appearance of its ſcaly ſpikes recalling very ſtrongly the idea of the no leſs extraordinary covering of that quadruped. Linn. Mant. 164. Schreb. 719. Mart. Mill. Dict. v. 3. Linn. fil. Nov. Gram. Gen. 21. t. 1. Juſſ. 34. Lamarck Illuſtr. t. 839. Gærtn. t. 175. Claſs and order, *Polygamia Monoecia*. Nat. Ord. *Gramina*.

Gen. Ch. *Perfect Flowers* imbricated, alternate, at the oppoſite ſides of a zigzag jointed ſpike, one to each joint, which is hollowed out to receive the baſe of the flower. *Cal.* Glume of two valves, ſingle-flowered; the *outermoſt valve* largeſt, coriaceous, rounded, rugged in the middle, either notched or entire at the top and ſides; *innermoſt* ſmaller, broadly lanceolate, membranous, cloſely preſſed to the former. *Cor.* Glume of two valves, membranous, thin and tranſparent, ſmaller than the calyx and concealed therein; the *outer valve* embracing with its edges the *inner*, which is ſmaller. Nectary a membranous ſcale. *Stam.* Filaments three, capillary, prominent; anthers oblong, incumbent. *Piſt.* Germen ovate, ſuperior; ſtyles two, ſhort, thread-ſhaped; ſtigmas oblong, bearded, ſpreading beyond the glumes at each ſide. *Peric.* none, the calyx incloſing the ſeed. *Seed* ſolitary, ovate.

Male Flowers marginal, alternate, at the back of the ſpike, projecting at each ſide, one to each joint. *Cal.* Glume of two valves, ſingle-flowered, nearly cylindrical; the *valves* equal, parallel, ovato-lanceolate, obtuſe, ſtriated, coriaceous, bordered with a membrane. *Cor.* Glume of two valves, membranous, thin, nearly as large as the calyx; the *outer valve* ovate, obtuſe, convoluted; *inner* lanceolate, plaited, ſcarcely longer than the outer. Nectary a membranous ſcale. *Stam.* Filaments three, very ſhort, ſometimes wanting; anthers as in the perfect flowers.

Eſſ. Ch. Perfect Flowers. Calyx a glume of two unequal, oppoſite valves, ſingle-flowered; the outer valve rounded and rugged. Corolla ſmaller than the calyx. Stamens three. Styles two.

Male Flowers. Calyx of two equal, parallel, oblong valves.

Obſ. This genus is one of the few that may properly be allowed to remain in the claſs *Polygamia*, as having a very different ſtructure in the two different kinds of flowers. Such is the caſe with the Britiſh genus *Atriplex*, but with few others admitted into this claſs by Linnæus. Theſe however, in our opinion, excuſe, if not juſtify, the preſervation of it in the Linnæan ſyſtem.

1. M. *myurus*. Mouſe-tail Scaly-graſs. Linn. Mant. 300. Linn. fil. Nov. Gram. Gen. t. 1. f. 1—3. Roxb. Corom. v. 2. 10. t. 117.—Outer glume of the perfect flowers elliptical, depreſſed, notched at the top and ſides. Sheaths of the leaves ſmooth.—Found by Koenig in dry elevated barren ground on the coaſt of Coromandel, not unfrequent. Dr. Roxburgh gathered it in the ſame country, and informs us that it is called by the Telingas *Nalla Panoocoo*. The *root* appears to be perennial, conſiſting of long, tough, downy fibres. *Stems* ſeveral, branched, jointed, leafy, ſmooth, compreſſed, ſolid, from 9 to 18 inches tall; decumbent and throwing out roots at their lower part. *Leaves* alternate, channelled, ſhort, narrow, acute, ſmooth, with long inflated ſheaths. *Spikes* about two inches long, linear, ſolitary at the ends of the principal, as well as the ſhort lateral, branches, compoſed of numerous, cloſely imbricated, *flowers*. The outer *glume* of ſuch as are furniſhed with both ſtamens and piſtil is ſhaped like a fiddle, its diſk marked with two tranſverſe elevations, and ſomewhat hairy, its membranous margin purpliſh. Dr. Roxburgh found two male florets in the oblong-leaved calyx, and his deſcription of the ſtructure and poſition of the calyx-glumes differs from that we have adopted, as well as from what we can diſcern in the dried ſpecimen, in which thoſe valves are certainly parallel, not oppoſite to each other, a very remarkable and diſtinguiſhing character between the male flowers and the perfect ones. The common ſtalk, or *rachis*, is zigzag, conſiſting of ſhort, turbinate, angular, ſlightly downy joints, each of which bears near its baſe, on one ſide, a ſingle perfect flower, and at its ſummit, on the oppoſite ſide, a male flower.

2. M. *granularis*. Granulated Scaly-graſs. Linn. fil. Nov. Gram. Gen. t. 1. f. 4—7. Swartz Prodr. 25. Ind. Occ. v. 1. 186. Roxb. Corom. v. 2. 11. t. 118. (Cenchrus granularis; Linn. Mant. 575. Gramen cyperoides polyſtachion, ſpicis ad nodos ex utriculis, ſeu foliorum alis, echinatis,

echinatis, prodeuntibus; Sloane Jam. v. 1. 120. t. 80.)—Outer glume of the perfect flowers orbicular, convex, entire, reticulated. Sheaths of the leaves hairy.—Native of the East and West Indies. Dr. Swartz gathered it in dry calcareous situations, in the south part of Jamaica; Roxburgh in bushy places, on the coast of Coromandel. The latter observes that both this and the foregoing are coarse grasses, not eaten by cattle. The *root* of the present is said by Swartz to be annual. It consists of numerous, nearly smooth, fibres. *Stem* a foot or two in height, branched from the bottom, leafy, round, smooth, slender. *Leaves* broad, taper-pointed, more or less hairy, with tumid, ribbed, very hairy, and minutely tuberculated, sheaths. *Spikes* solitary, at the ends of small, lateral, axillary, leafy branches. Each *spike* is about an inch long, composed of numerous imbricated *flowers*, on a zigzag stalk, the united ones conspicuous on one side, the males on the other. The outer *calyx-glume* of the former is orbicular, pale or purplish, the size of a small pin's head, strongly reticulated with elevated ribs, and intermediate depressions. Swartz says there are two inner glumes, which are ovate, nearly equal, pointed, white and pellucid. Roxburgh's figure does not accord with this. The former writer describes the *corolla* as of two minute, ovate, whitish glumes, half the size of the outer valve of the calyx, and the nectary of two extremely diminutive, fleshy, whitish scales, forming a cup at the base of the germen and stamens. The *male flowers* are rather larger, each consisting of two parallel, equal, ovate calyx-glumes, which are striated and hispid, with a small, white, bivalve *corolla*, and a similar nectary to the other. S.

MANITOU, or MANITOUALIN *Islands*, in *Geography*, a cluster of islands towards the N. shore of lake Huron, stretching from the vicinity of Cabots head, north-westerly across the lake to lake George, below the falls of St. Mary. These islands are held sacred by the Indians.

MANITOU *Kiamen*, a post of Chinese Tartary, in the country of the Kalkas. N. lat. 43° 22'. E. long. 106° 40'.

MANITOU *Oudour*, a town of Chinese Tartary, in the country of the Monguls. N. lat. 42°. E. long. 112° 14'.

MANITZKAIA, a town of Russia, in the country of the Cossacks; 40 miles E.N.E. of Azof.

MANIVAL, a town on the E. coast of Madagascar. S. lat. 17° 10' E. long 50°.

MANKAKO, a town of the island of Celebes, in Buggess bay, in which is a good market for gold and sago. S. lat 1° 45'.

MANKALIA, a sea-port town of Bulgaria, on the Black sea; 68 miles E.S.E. of Silistria. N. lat. 44°. E. long 28° 39'.

MANKANET, or ST. JOSEPH, a town of Africa, in Galam, in which is a French factory.

MANKAP, a small island in the East Indian sea, near the S. coast of Borneo. S. lat. 3° 2'. E. long. 109° 58'.

MANKETS. See NOGAYANS.

MANKOVA, a town of Russia, in the government of Irkutsk, on the Angara; 44 miles S.E. of Balaganskoi.

MANKOUH, a town of Persia, in the province of Khorasan; 66 miles N. of Meschid.

MANKOW. See *Ivory* COAST.

MANKUTOSKA, a town of Russia, in the government of Irkutsk; 28 miles N. of Stretensk.

MANLIUS, MARCUS, surnamed *Capitolinus*, in *Biography*, a distinguished Roman, was brought up to arms, and is said to have already served the office of consul, when he was one of the garrison of the Capitol at its siege by the Gauls in the year 390. On the attempt of the enemy to surprise it by night, Manlius was the first person awakened by the noise of the geese kept in the fortress. He ran to the ramparts, threw down two Gauls who had mounted to the top; and the alarm being caught by the centinels, the enterprize was defeated, and the Capitol saved. For this heroic act, Manlius received a house in the Capitol, with the title of Capitolinus. The high reputation which he now enjoyed, stimulated his ambition to become the first man in Rome. Camillus, the faviour of his country, was at the head of the patrician party, and Manlius, jealous of his power, threw himself into the opposite party, and began to court the Plebeians, by railing at the rich, and patronizing their insolvent and enslaved debtors, of whom there was always a great number in Rome. He liberated several of these at his own expence, and stood forth as the public advocate of the people in the division of the conquered lands. On account of some false charges which he exhibited against the nobles, he was thrown into prison; still, however, he was regarded as the hero of the party, and when he was liberated, he kept no measure in his hostility to the nobles, but proposed the abolition of consulates and dictatorships, and a perfect equality of rights. He offered himself as a leader to enforce these changes, and is said to have formed a plot to seize the Capitol, and usurp the sovereign power. The senate now passed a decree, enjoining the military tribunes "to take care that the republic should suffer no detriment," which was the form of investing them with absolute power. Manlius was charged with the crime of aiming at regal power; he appeared before his judges with mourning, unsupported by his nearest relations, who were of the opposite party. To excite the favour and compassion of the people, he produced four hundred persons whose debts he had paid; he displayed thirty suits of armour won from as many foes slain by him in single combat; a mural crown, and eight civic crowns; and he enumerated thirty-seven rewards received from his generals for acts of extraordinary valour. Lastly, he pointed to the Capitol itself, which he had saved, and which was full in view from the Campus Martius, the place of trial, and invoked its gods to his assistance. So long as this object was in their sight, the people refused to find him guilty, but when the place of assembly had been altered to a grove from which the Capitol could not be seen, sentence was obtained against him, and he was condemned to be thrown down from that very rock which he had defended from the attack of the Gauls. This execution took place in the year 384 B.C., and a decree was at the same time passed, that no patrician should from that time dwell in the Capitol. Plutarch. Livy.

MANLIUS, TITUS, surnamed *Torquatus*, a celebrated commander of the same family with the preceding, the son of Titus Manlius Imperiosus, who after he had served the office of dictator in 363, was cited before the people to answer for various acts of cruelty, and one of the charges against him was for keeping his son Titus, in the country, at work among his slaves, for no other reason than that he was of slow parts, and had an impediment in his speech. The young man being informed of this accusation, went to Rome by night, and proceeded directly to the house of the tribune Pomponius, his father's accuser, demanded a private interview; then drew a dagger and threatened him with instant death unless he took an oath to drop the prosecution against his father, with which he very readily complied. The people were so well pleased with this instance of filial piety, though in favour of a man whom they detested, that they raised the young Titus to the post of legionary tribune. Some time afterwards, when the Gauls, invading the Roman territory, had advanced within three miles of the

the city, and both armies lay on oppofite banks of the Anio, one of the enemy, of gigantic ftature, came to the bridge and challenged the braveft man among the Romans; Manlius begged to be allowed to accept the challenge, and armed with a fhort fword and buckler advanced to the encounter. Victory decided in his favour, and the Gauls, confidering the death of their champion as an omen of ill fuccefs, abandoned their camp in the night, and made a precipitate retreat. Manlius obtained the name of "Torquatus" from having torn a golden collar from the neck of his antagonift, and putting it on his own. In the year 355, he was nominated to the dictatorfhip, though he had not yet been conful, on account of his great merit. He was a fecond time dictator, and then fucceeded to the confulate. In the year 340, he marched with Decius Mus, to fupprefs a dangerous war with the Latins, and it was refolved, that no foldier nor commander fhould quit his ranks, or even fight, without exprefs permiffion, on pain of death. Soon after Manlius, the fon of Torquatus, who commanded a detachment of horfe, meeting with a fquadron of the enemy, was challenged to fingle combat by its leader; he in the height of his ardour accepted the offer, and flew his antagonift. Having ftripped him of his armour, he went triumphantly to his father's tent, and relating the deed, laid the fpoils at his feet. The conful immediately, and in the prefence of the Roman army, pronounced againft him fentence of death for difobedience of orders. In the enfuing battle, Decius was flain, and the event remained in doubt, till Manlius, by a fkilful movement, decided the day and gained a complete victory. On his return to Rome, he was received with honour by the feniors, but the younger part of the citizens abhorring his rigour towards his fon, refufed to go out to meet him. He was afterwards offered the confulfhip by general confent, but he declined it, telling the people, that as they could not bear his feverity, fo neither could he put up with their licentioufnefs. Livy. Univer. Hift.

Manlius, in *Geography*, a poft-town in Onondago county, New York, incorporated in 1794, and the feat of the county courts. It is well watered by feveral creeks, which unite at the N.E. corner of the town; and the ftream affuming the name Chittenengo, runs N. to Oneida lake, lying 10 miles N. of the centre of the town. It comprehends that part of the Onondago refervation, bounded S. by the Geneffee road, and W. by Onondago creek and the Salt lake. It contains 989 inhabitants.

MANNA, a diftrict, and alfo a river, on the fouth-weft coaft of the ifland of Sumatra. In this diftrict a progrefs in the art of cultivation is difcovered, fuperior to what appears in almoft any other part of the ifland; that occupied by the Battas excepted. Here the traveller may fee pieces of land, in fize from five to fifteen acres, regularly ploughed and harrowed. Mr. Marfden accounts for this difference by obferving that Manna is by much the moft populous diftrict to the fouthward, with the fmalleft extent of fea-coaft. Neceffity obliges them to cultivate the earth; or otherwife they would be obliged to abandon their native foil. In order to underftand the rate of produce, we muft firft explain the terms ufed in defcribing it. "Paddee" is rice whilft it is in the hufk; and paddee in Sumatra and the Malay iflands is diftinguifhed into two forts, *viz.* "laddang," or upland paddee, and "fawoor," or low-land; and thefe are always kept feparate, and will not grow reciprocally. From grounds tilled as they are, in the diftrict of Manna, the produce is reckoned at 30 for one; from the laddangs in common it is about 60 or 80. The fawoors are generally fuppofed to yield an increafe of 100 for one, but in fome of the northern parts 120. The excefs of this proportion of produce above that of our fields in Europe, which feldom exceeds 15, and is often under 10, is afcribed to various circumftances; *viz.* the difference of grain, rice being extremely prolific; the more genial influence of a warmer climate; and the earth's gradually lofing, by an exceffive cultivation, its fecundity; but principally, as Mr. Marfden conceives, to the different ftyle of cultivation. The Sumatrans, who do not grudge time or labour, make holes in the ground, and drop into each a few grains; or, by a procefs ftill more tedious, raife the feed in beds, and afterwards plant it out. The diftrict of Manna, as well as other parts of Sumatra, is fubject to very deftructive earthquakes. By a fevere calamity of this kind that occurred in 1770, a village was deftroyed by the houfes falling down and taking fire, and feveral lives were loft. The ground in one place was rent for a quarter of a mile to the width of two fathoms and depth of four or five. A bituminous matter is defcribed to have fwelled over the fides of the cavity, and the earth, for a long time after the fhock, was obferved to contract and dilate alternately. Many parts of the hills far inland, could be diftinguifhed to have given way, and as a confequence of this, Manna river was fo much impregnated with particles of clay that the natives could not bathe in it. At this time was formed, near to the mouth of Padang-goochie, a neighbouring river, fouth of the former, a large plain, feven miles long, and half a mile broad, where had before been only a narrow beach. A fmall but beautiful cafcade defcends perpendicularly from the fteep cliff, which, like an immenfe rampart, lines the fea-fhore near Manna. No country in the world is better watered than this. Springs are found wherever they are fought for. The rivers on the weftern coaft are innumerable, but too fmall and rapid for the purpofes of navigation. The vicinity of the mountains to that fide of the ifland occafions this profufion of rivulets, whilft it prevents their accumulating to any fize. At Manna the "Soompatan," that is, the fwearing apparatus, on which an oath is adminiftered, is a gun-barrel. When ufed for this purpofe, it is carried to the fpot in ftate, under an umbrella, and wrapt in filk. This parade has an advantageous effect, by influencing the mind of the party with an high idea of the importance and folemnity of an oath. In England it is to be regretted, that the familiarity of the object, and the fummary method of adminiftering oaths, are well known to diminifh their influence, and to render them too often nugatory. The Sumatrans fometimes fwear by the earth, laying their hands upon it, and wifhing that it may never produce aught for their nourifhment if they fpeak falfely. Marfden's Sumatra. The town of *Manna* is diftant 300 miles S.W. from Indrapour. S. lat. 4° 25′. E. long. 102° 40′.

Manna, a town of Africa, in Jallonkadoo, near the Senegal. N. lat. 12° 20′. W. long. 8° 50′.

Manna, in *Pharmacy*, a medicinal drug, of great ufe in the modern practice, as a gentle purgative, and cleanfer of the firft paffages.

Manna is a white fweet juice oozing from the trunk, branches, and leaves of a kind of afh-tree, being the Fraxinus *Ornus* (which fee), chiefly in Calabria, during the heats of fummer.

Manna has been erroneoufly held to be a kind of *mel aerium*, or honey-dew, which, falling in the night, gathers on certain trees, and even on rocks, and on the earth itfelf; where it hardens with the fun. But what refutes this opinion is, that fuch dews melt in the fun; whereas manna whitens and hardens in it. Add, that fuch dews are only found on the tops and extremes of the leaves, whereas manna is chiefly found to lodge on the trunks of the branches: and that the honey-

dew

dew falls only on trees open to the air; whereas manna is found on trees which are under cover; as was experienced by Dr. Cornelius, who gathered manna from branches covered on purpofe with cloth; and Lobel affures us, that manna had been gathered from branches of the afh, which had been thrown the day before into a cellar. It is much more rational to rank manna amongft the number of gums, which, exuding from the juice of the tree, is condenfed into thofe flakes in which we fee it.

Manna is far from being peculiar to the afh-tree of Calabria, on which it is ufually found. The Ornus is not the only fpecies of Afh or Fraxinus which produces it. It is afforded, though in lefs abundance, particularly in Sicily, by the *Fraxinus rotundifolia* and *excelfior*: thefe three fpecies are cultivated in Sicily, and planted on the declivity of a hill, with an eaftern afpect for the purpofe of procuring manna. After 10 years' growth, the trees begin to yield the manna, but they do not afford it in very confiderable quantity till they are much older; and as manna is no other than the matter of the fenfible tranfpiration of trees and plants in general, it is found on many different kinds, in different quantities.

At Briançon, in France, they collect manna from all forts of trees that grow there; and the inhabitants obferve, that fuch fummers as produce them the greateft quantities of manna, are very fatal to their trees. Their walnut-trees produce annually a confiderable quantity; but if there happen a year in which they produce more than ordinary, they ufually find many of them perifh in the following winter.

It feems very plain from the whole, that manna is only the extravafated juice of the tree, which cannot furvive fo great a lofs of it: and what not a little confirms this is, that the very hot fummers are always thofe which are the moft abundantly productive of manna. The ancients were fenfible of this fpontaneous production of manna, of feveral fpecies of trees, fo very different from one another, and from thence fell into the error of fuppofing it fomething wholly foreign to the tree; an error very natural to thofe who did not know that the nutritive juices of very many trees are nearly, if not wholly the fame. It was from this opinion of its origin, that they called it aerial honey.

Dr. Cullen very properly fuppofes manna to be a part of the fugar fo univerfally prefent in vegetables, and which exudes on the furface of a great number of them; and he thinks that the qualities of thefe exudations are very little, if at all different. The principal trees known to produce thefe mannas in different climates and feafons are, the larch, the fir, the orange, the walnut, the willow, the mulberry, oaks, the hagi Maurorum, or Hedyfarum alhagi of Linnæus. Of this latter Dr. Fothergill prefented a fpecimen to the Royal Society, which he confidered as the "Tereniabin" of the Arabians. (Phil. Tranf. vol. xliii. p. 87.) The Ciftus ladaniferus in fome parts of Spain produces a manna, which, in its recent ftate, has no purgative quality, and is eaten by the fhepherds, fo that fome fermentation feems to be neceffary, in order to give it a cathartic power.

The Italians gather three kinds of manna:—*Manna di corpo*, which oozes fpontaneoufly from the branches of the tree in the month of July. *Manna forfata*, or *forzatella*, which is not gathered till Auguft, after an incifion of the tree, when the flux of the firft has ceafed. *Manna di fronda*, which iffues of itfelf, in little drops, like a kind of fweat, from the nervous part of the leaves of the afh, and gathers into grains about the bignefs of thofe of wheat, which are hardened by the fun in Auguft. The leaves are frequently found fo laden with thefe grains, that they feem covered with fnow.

Although the manna exudes fpontaneoufly upon the afh-trees, yet for obtaining it more copioufly, incifions are made through the bark by means of a fharp crooked inftrument; and the feafon thought to be the moft favourable for inftituting this procefs is a little before the dog-days commence, when the weather is dry and ferene. The incifions are firft made in the lower part of the trunk, and repeated at the diftance of an inch from the former wound, ftill extending the incifions upwards as far as the branches, and confining them to one fide of the tree; the other fide being referved till the year following, when it undergoes the fame treatment. On making thefe incifions, which are of a longitudinal direction, about a fpan in length, and nearly two inches wide, a thick whitifh juice immediately begins to flow, which gradually hardens on the bark, and in the courfe of eight days acquires the confiftence and appearance in which the manna is imported into Britain, when it is collected in bafkets, and afterwards packed in large chefts. Sometimes the manna flows in fuch abundance from the incifions, that it runs upon the ground, by which it is mixed with various impurities, unlefs prevented, as is ufually the cafe, by interpofing large concave leaves, ftones, chips of wood, &c. The bufinefs of collecting manna ufually terminates at the end of September, when the rainy feafon fets in. Dr. Cirillo's account of the manner of collecting manna in the kingdom of Naples was communicated to the Royal Society, and was publifhed in Phil. Tranf. vol. lx. This ingenious writer begins with correcting a miftake, founded on an erroneous opinion of the ancients, which ftates the beft and pureft manna to be that which is obtained from the leaves of the tree. He never faw fuch a kind, and all thofe who are employed in the gathering of the manna, know of none that comes from the leaves. The manna is generally of two kinds, not differing in their intrinfic quality, but in the manner by which they are procured. In order to have the manna, fays our author, thofe who have the management of the woods of the Orni in the months of July and Auguft, when the weather is very dry and warm, make an oblong incifion, and take off from the bark of the tree about three inches in length and two in breadth; they leave the wound open, and by degrees the manna runs out, and is almoft fuddenly thickened to the proper confiftence, and is found adhering to the bark of the tree. This manna, which is collected in bafkets, and goes under the name of "manna groffa," is put in a dry place, becaufe moift and wet places will foon diffolve it again. This firft kind is often in large irregular pieces of a brownifh colour, and is frequently full of duft and other impurities. But when the people want to have a very fine manna, they apply to the incifion of the bark thin ftraw, or fmall bits of fhrubs, fo that the manna, in coming out, runs upon thofe bodies, and is collected in a fort of regular tubes, which gives it the name of "manna in cannoli," that is, manna in tubes: the fecond kind is more efteemed, and always preferred to the other, becaufe it is free and clear. There is indeed a third kind of manna, which is not commonly met with, and which our author fays he has feen fince he left Calabria: it is very white, like fugar; but as it is rather for curiofity than for ufe, he fays no more of it. The two forts of manna already mentioned undergo no kind of preparation whatfoever, before they are exported; fometimes they are finer, particularly the "manna groffa," and fometimes very dirty and full of impurities; but the Neapolitans have no intereft in adulterating the manna, becaufe they have always a great deal more than what they generally export; and if manna is kept in the magazines, it receives often very great hurt by the fouthern winds, fo common in our part of the world. The changes of the weather producees a fudden alteration in the time that the manna is to be gathered; and for

for this reafon, when the fummer is rainy, the manna is always very fcarce and very bad.

Manna is generally diftinguifhed into different kinds, *viz.* the manna in tears, the canulated and flaky manna, and the common brown or fat manna ; differences which depend upon their refpective purity, and the manner in which they are procured from the tree, and not upon the nature of the drug itfelf. When the juice tranfudes very flowly, the manna is more dry, tranfparent, and pure, and confequently of higher eftimation ; but when it flows more copioufly, it concretes into a coarfe brown unctuous mafs ; and hence we perceive that by applying ftraw, &c. to receive the flowing juice, the manna becomes much improved. Houel, who tafted the manna when flowing from the tree, found it much more bitter than in its concrete ftate ; and this bitternefs he afcribes to the aqueous part, which is then abundant : whence it appears that the manna is meliorated by all the circumftances which promote evaporation. Manna is a fubftance in many things very nearly related to fugar and to honey ; it is inflammable in the fame manner, and it melts in water as eafily as fugar, and liquifies even in a moift air, and by the affiftance of heat, in rectified fpirit alfo ; the impurities only being left by both menftrua. On infpiffating the watery folution, the manna is recovered of a much darker colour than at firft. From the faturated fpirituous folution great part of it feparates as the liquor cools, concreting into a flaky mafs, of a fnowy whitenefs, and a very grateful fweetnefs. When expofed on hot coals, it fwells, takes fire, and leaves a light bulky coal. When boiled with lime, clarified with white of egg, and concentrated by evaporation, it affords cryftals of fugar. By diftillation manna affords water, acid, oil, and ammonia ; and its coal affords alkali.

M. Lemery, in his analyfis, drew from manna a vinous liquor, of the fame kind with that obtained from honey. Mead may alfo be made of manna, in the fame way that it is made from honey ; but it is neither fo ftrong, nor fo agreeable to the tafte as that of honey. From as much mead as was made from two pounds of manna, M. Lemery drew off by diftillation eight ounces of a fort of brandy, and on rectifying this, procured an ounce and a half of a pure burning fpirit, like in all refpects to rectified fpirit of wine. This fpirit of manna is accounted by fome a fudorific, and is given from half a dram to a dram and a half. M. Lemery having left the remaining liquor, after the diftillation of the fpirituous part of the manna mead, in a warm place for two years, found that it depofited to the bottoms of the bottles feven drams of an effential falt of manna, which was white, hard, brittle, and formed into fine needles, and was of an acid tafte, with an admixture of fweet. This falt is purgative, and its dofe is a dram. All the remaining acid liquur being diftilled, there remained at the bottom of the retort a quantity of matter of the confiftence of honey, which weighed twenty ounces ; fo that out of two pounds of manna, there had been twelve ounces confumed, to make the fpirit. and to give the acidity to the remaining liquor. This honey-like refiduum, being finally diftilled with aftrong fire, there arofe a reddifh liquor of an acrid tafte, and with a ftrong empyreumatic fmell, and with this a few drops of blackifh oil ; after this operation, the remainder in the retort was four ounces of a very light black coal. The coal, it is to be obferved, is here only one-eighth of the weight of the manna, which is fomewhat fingular, fince in the pureft honey, treated in the fame manner, it always weighs one-fourth of the original whole quantity. It is plain from hence, that manna is a much purer fubftance than honey : it is alfo remarkable, that in farther treatment of this coal, there is a fmall quantity of iron always difcovered in it. Manna, honey, and all the other fweet fubftances, we fee, alfo lofe all their fweetnefs as foon as ever their acid is feparated from their oil. Hift. Acad. Par. 1708, p. 56.

The beft fort of manna is that in oblong pieces or flakes, moderately dry, friable, very light, of a whitifh or pale yellow colour, and, in fome degree, tranfparent : the inferior kinds are moift, unctuous, and brown. Manna of both forts is fometimes counterfeited by compofitions of fugar, honey, and purgative materials, which may be diftinguifhed in their folid form by their weight, compactnefs, and tranfparency ; and in the dry and moift ftate, by their tafte, and by their habitude to menftrua. Manna, in dofes of an ounce and upwards, proves a gentle laxative ; it operates in general with great mildnefs, fo as to be fafely given even to children and pregnant women, and in inflammatory or acute diftempers, where the ftimulating purgatives have no place It is particularly proper in ftomachic coughs ; in which intentions it is fometimes made up in a linctus or lohoch, with equal quantities of oil of almonds, and fyrup of violets. The gripes, flatulencies, and other inconveniences attending it in fome conftitutions, and when given to adults in large dofes, may be obviated by a fmall addition of fome grateful aromatic. Manna does not produce the full effect of a cathartic, unlefs taken in large dofes, as two ounces or more ; and, therefore, is feldom employed for this purpofe by itfelf : it may be commodioufly diffolved in the purging mineral waters, or fharpened with the cathartic falts, or other purgatives : its efficacy is faid to be much promoted by caffia fiftularis, a mixture of the two purging more than either of them feparately : it is therefore very properly an ingredient in the "electuarium e caffia."

Manna is alfo a fcripture term, fignifying a miraculous kind of food, which fell from heaven, for the fupport of the Ifraelites, in their paffage through the wildernefs ; being a fmall grain, white, like hoar-froft, round and of the fize of coriander feeds ; its colour like that of bdellium, and its tafte like honey.

They call it *manna*, either from the Hebrew word *manah*, *a gift*, to intimate its being a gift from heaven ; or from *minnah*, which fignifies *to prepare*, becaufe the manna came to them ready for eating, and needed no preparation but gathering ; or from the Egyptian word *man*, derived from the Hebrew *mah*, *what is it ?* which laft etymology feems the more probable, in regard the fcripture takes notice of the furprize they were under when they firft faw this new food defcend. Accordingly the Hebrews, on firft feeing this new food which God had provided for them, faid to one another *man-hu*, or *mah-hu*, *what is this ?* Others, among whom are Saumaife and many moderns, maintain, that the Hebrews well knew what manna was, and faid to one another, *man-hu*, *this is manna.*

Salmafius, however, prefers another etymology : according to him, the Arabs and Chaldeans ufed the word *man* to fignify a kind of dew or honey that fell on the trees, and was gathered in great abundance on mount Libanus. On which footing the Ifraelites did not ufe the term manna out of furprize, but becaufe they found this food fall with the dew, in the fame manner as the honey-dew, fo well known to them under the name of *man.* Salmafius adds, that the manna of the Ifraelities was in reality no other than that honey, or dew, condenfed ; and that the one and the other were the fame with the wild honey with which St. John was fed in the wildernefs ; fo that the miracle did not confift in the formation of any new fubftance in favour of the Ifraelites, but in the punctual manner in which it was difpenfed by Providence for the fuftenance of fo vaft a multitude.

On the contrary, the Hebrews and Orientals believe, that the fall of the manna was wholly miraculous. Whatever was the nature of this fubftance, which it is not eafy, or perhaps poffible, for us to afcertain, it was by the difpenfation of Providence a nutritive food, and ferved the children of Ifrael during their migration in the defarts of Arabia for forty years, from their eighth encampment in the wildernefs of Sin. Manna began to fall on Friday morning, the 16th day of the fecond month, which from thence was called Jiar; and, according to Ufher, this was Friday the 5th of June. (Exod. xvi. 14, 15.) It continued to fall daily in the morning, except on the fabbath, till after the paffage over Jordan, and to the paffover of the 40th year from the Exodus, *i. e.* from Friday the 5th of June, A.M. 2513, to the fecond day of the paffover, Wednefday the 5th of May, A.M. 2553, B.C. 1451. This manna, whatever it was, fell in fuch quantities, during forty years, as to be fufficient for the fuftenance of about a million of perfons. Every Friday it fell in a double portion (Exod. xvi. 5.): and though on other days it putrified, if it were kept from one day to another, yet on the fabbath it fuffered no fuch alteration. Thus, the Ifraelites were inftructed in their conftant and neceffary dependence on the providence of God.

MANNA *Alhagina*, a word ufed by fome authors to exprefs that kind of manna called by others *manna maftichina*, from its drops refembling maftich in fmall tears. It is called *alhagina* from the plant which produces it, it being collected from the *alhagi maurorum*, in the fame manner as the common manna from the Calabrian afh.

MANNA *Libanotis*, in the *Materia Medica*, a name given by the old Greek writers to the fmall flakes and fragments of the frankincenfe, which flew off the larger pieces in the gathering and putting them up. See LEPTOS *Libanotis*.

MANNA *Maftichina*, a name given by fome authors to a kind of manna which they defcribe as refembling maftich in its colour, and the fize of the lumps it is collected in. This is what we ufually know at this time under the name of *manna Perficum*, or *Perfian manna*, which is even now in ufe in medicine, in the Eaft, as a common purge.

MANNA *Perficum*, *Perfian Manna*. It does not appear in the writings of the ancient Greek phyficians, that they were acquainted with any fpecies of manna, though that medicine be now fo common in the fhops. They had the word indeed, but they applied it to a very different fenfe; what they called manna being what fome authors ftill called the manna of frankincenfe, that is fuch pieces of the common olibanum as broke off in the carriage from the larger pieces. Phil. Tranf. N° 472. p. 86. in vol. xlii.

The Arabians are by fome fuppofed to have firft brought what we call manna into ufe in medicine; but if they were not the abfolute inventors of this ufe of it, it is certain they were the firft who made it general and common as a purge. Their country afforded feveral diftinct fpecies of manna, all which feem to have been fo common among them, that they thought defcriptions of them needlefs; and for that reafon have not left us fufficient accounts of them, from which to determine what were their characters and differences. They diftinguifhed three kinds of this purging medicine, under three abfolute different names, which were *manna*, *tereniabin*, and *firacoft*; but it is not eafily proved whether thefe are all now known, or by what appellations they are at this time diftinguifhed.

Rawwolf, in his Itinerary publifhed by Mr. Ray, and Tournefort in his voyage to the Levant, have given the cleareft intimations, in regard to this fubject, of any of the known writers; and if to thefe we add Clufius, we have among the three all that is to be expected of any certainty upon the fubject; yet the defcriptions of thefe, though eyewitneffes of all they write, have not prevented fo eminent and late a writer as Geoffroy, from falling into an error concerning the manna of the Arabians. It is very evident, however, that we have ftill one fpecies of the manna Arabum, that is, the *tereniabin*, produced in fome parts of the world, there having been fpecimens of it fent over into England from Peterfburgh, near which place it is collected from a plant known among botanical writers under the name of *alhagi maurorum*.

This is ufually called *manna Perficum*; it appears at firft fight a mixed mafs of dirty reddifh-brown colour, but, upon a nearer view, it is feen to confift of feveral forts of particles. Firft, a great number of globular, cryftalline, and almoft tranfparent bodies of different fizes, and of a yellowifh-white colour; the biggeft of thefe do not much exceed a larger coriander-feed in fize, and they have fomewhat the appearance of fmall lumps of maftic, but are of a fomewhat reddifh caft. Secondly, there is among thefe a large quantity of fmall prickles, and other little woody bodies, which feem to have been the pedicles of leaves. Thirdly, there are a few fmall leaves which are of firm texture, and terminate in narrow points. Fourthly, there are a large number of fmall long reddifh coloured pods, of a fweetifh gelatinous tafte, containing from one to fix or feven hard, irregular, and kidney-fhaped feeds, which to the tafte are very four. And fifthly, there is ufually fome fand and earth among it. Four ounces of this manna diffolved in water ufually leave about one ounce of thefe fubftances in the filtre.

The globules firft defcribed are fomething hard, they break between the teeth like fugar-candy, and are of a pleafant fweet tafte, but have much lefs of the manna flavour than the Calabrian, but enough of it to difcover to what family the fubftance belongs: the feeds, fticks, leaves, and pods, feem to be all of them parts of the plant which produces the manna; and the feeds having been fown with us, have raifed plants of the alhagi. About the year 1537, when Rawwolf wrote his Itinerary, it appears that large quantities of this kind of manna were brought from Perfia to Aleppo, where it was then known by the name of *trunfchibil*, or *trunfchibin*, a corruption doubtlefs of the word *terenjabin*, or, as it ought to be written, according to Deufingius, *tereng jabin*.

Rawwolf alfo exprefsly informs us, that this fpecies of manna was gathered from a plant called *alhagi*. This plant is minutely defcribed by Tournefort, who confirms the account of the manna being gathered from it, which Rawwolf had given fo long before.

Tournefort fays, that it is chiefly gathered about Tauris, a city of Perfia, under the name of *trunjibin*, or *terenjabin*, mentioned by Avicenna and Serapion; he adds, that thofe authors thought it fell upon certain prickly fhrubs; whereas it is really the nutritious juice of the plant; and that, during the great heats in that part of the world, there are perceived fmall round drops, as it were, of honey ftanding upon the leaves of this plant; and that thefe harden into globules about the fize of coriander-feeds, and are then gathered by the inhabitants, together with leaves, ftalks, dirt, and the like foreign matter, which greatly take off from their virtue. M. Tournefort obferves, that this manna is greatly inferior to the Calabrian in virtue; and that twenty or thirty drams of it are given for a dofe. Philof. Tranf. N 472, p. 90. ubi fupra.

Clufius tells us, that the *terenjabin* of the Arabians is gathered from a prickly fhrub, fuch as the alhagi is defcribed

to

to be; and Avicenna declares, that it was found upon a thorny plant; though his translators have been misled from the near resemblance of two Arabic words, to make it stones, not a plant, that it was gathered from.

It appears very plainly from the whole, that this substance, now known in Russia, and some other parts of the world, under the name of *manna Persicum*, is truly the *terenjabin* of the Arabians and of Clusius, Rawwolf, and Tournefort; only that the word is differently spelt by the latter authors, and it is probably also that manna called by Bauhine, and some other writers, *manna mastichina orientalis*, from the round globules it is composed of resembling the drops of mastich.

Manna *Thuris*, the *manna of frankincense*, a term used by the ancient physicians to express such small pieces of frankincense, or olibanum, as broke off from the larger in the carriage. See Leptos *Libanotis*.

MANNACOTE, in *Geography*, a town of Kemaoon; 60 miles N.W. of Kerigar.

MANNEBACANI, a town of Congo; 40 miles S.W. of Congo.

MANNER, in *Painting*, is not only employed in its natural sense, as designatory of that peculiarity in each painter's mode of composition, drawing, and execution, which, like diversity in hand-writings, characterises the productions of different individuals; but it has also a technical meaning, in which it is commonly employed by artists and connoisseurs, *viz.* to mark certain kinds of deviation from nature in the works of artists, into which, either through conceit or weakness, they have fallen, by endeavouring to obtain that high portion of acknowledged excellence, known by the name of style; of which manner may be considered as the bathos.

The proper application of this word in the art is evident. No two painters have ever executed their works in a manner exactly similar, how nearly soever they may have imitated each other. In every case variety still appears, extending through every portion and principle of their compositions, as well as in their execution of them: just as men think and write differently upon the same subjects, and convey their ideas by dissimilar characters, though tracing the same letters.

It is by this diversity that connoisseurs are enabled to ascertain the authors of pictures, whose names as such would otherwise have been lost: by this the different schools of art are pointed out, and the works of the artists educated in them; although some of superior excellence have varied their manner, in the course of their practice, more than once. Thus, Titian is said to have had his first, second, and third manner; Raphael, his Perugino manner, his own, and that framed in imitation of Michael Angelo. By this, also, the gradual advance of the art may be traced, from its earliest periods, to its arrival at the highest perfection which it attained in the Italian and Flemish schools.

This is the natural and obvious sense of the word; the other is more easily felt th n defined. Every artist and amateur, conversant with the necessities and beauties of art, knows and feels that nature is not to be copied at all times, and under every situation. Her works must be selected and imitated only in her happiest moments, in her very best productions. When an artist understands, and can exhibit in his works those peculiarities which exemplify the purity of this select class of natural objects, in all their differing characters, and can avoid the trifling matters which are unnecessary in grand representations, adhering only to that which is truly characteristic, and giving to it all possible truth and force, he has obtained that dignified power which is denominated style. If, in the attempt, he misses his course, and stumbles upon a misconception of true character, and substitutes fanciful perfections of form and colour, which have not the foundation of genuine nature to support them, his style degenerates to manner: being false in its basis, it cannot be ennobled by that higher title, which of necessity implies truth.

Every application of style is indeed a manner; but the latter word is never used for the former, generally in opposition to it, and always derogatory to the artist and his works. For instance, Michael Angelo gave a fulness and grandeur to the form of man in his pictures, which is not to be found so complete in nature. But his perfect knowledge of the nature of the human frame, and the principles upon which it was set in motion, enabled him to apply his peculiar taste of line in a just and characteristic manner; so that though nature appears in his works to be almost extravagantly exerted, still it is not violated: hence the appropriate expression for his works is, that they are wrought in a grand style. His German imitators we speak of as mannerists; because, without comprehending his principles, they imitated his style, only to produce contortions and swellings without character or meaning; muscles in false motions, merely to produce something like what they saw and felt was grand and imposing; a fulness and wave of line, which they carried into parts that ought to have been tranquil, square, or straight: and thus falsifying the style, their art was mannered, drawn from other art, and not from nature.

Art has three stages, as natural to it as childhood, manhood, and age, to man; *viz. imitation*, *style*, and *manner*. The first is the sole object which can present itself to the wish of those who attempt to paint, without having any pictures before them; the imitation of a natural object being the proposed end of the attempt. When a man has obtained the power of representing bodies, he naturally seeks for the best and most agreeable subjects for the exercise of his acquired power, and also endeavours to give them as much beauty and interest as possible; this necessarily leads to *style*: and this, once acquired and exhibited to view, excites others to improve upon and indulge their minds in the ideal gratification which arises from it, and in weak hands produces *manner*, the bane of the art and artist. One striking difference between style and manner is this: the former may at first sight be unsatisfactory to an uninformed mind, but investigation will gradually increase its value, and heighten it in estimation; the latter, on the contrary, may charm at first sight, but never fails to disgust on a prolonged observation, when its folly and imperfection become apparent. It is an evil which those are always in great danger of being subjected to, who endeavour to make their pictures agreeable, rather than impressive; and forget that the highest praise due to an artist is given only, when he claims it by correctness of force and expression.

A simple imitation may be wrought in a bad or good style: it cannot be said to be mannered, unless some violation of the principles of nature appear introduced, in order to give an ideal improvement upon the natural effect. In drawing, all affectations of square or round, of straight or undulating lines; in colour, all introductions of florid or dull tints, which trench upon the true simplicity of nature; and in expression, all extravagant increase of actions in the features or limbs of a figure, which are not justified by the sentiment intended to be conveyed; all these come under the denomination of manner. These peculiarities are frequently to be found in the works of truly g eat men; but they are not the less objectionable in principle, and perhaps would not have been employed by them but to overcome ſome local diſadvantage: in that caſe, ſtyle becomes their proper name. But the want of this conſideration has often led ſtudents to the admiration of theſe very defects, and a blind imitation of them, which neceſſarily generates manner. Thus, Rubens's ſtyle of colour is in itſelf ſo violent, that, if not fully maintained in all its harmony, it deſerves no better title than manner, and becomes completely ſo in the hands of moſt of his imitators.

Titian's colour juſtly merits the moſt diſtinguiſhed appellation. It is true to nature, but it is in her ſimple garb, robbed of her minuter reflections and refractions, yet carefully followed in her general principles, and enriched and heightened by a favourable ſelection and arrangement of objects, their being placed in agreeable lights, and viewed in a choſen direction. The Venetians carried it to manner: even Tintoretto and P. Veroneſe, the beſt and grandeſt amongſt them after Titian and Giorgione. Having imbibed a taſte for the rich and luxurious colouring of their predeceſſors, they could not be content without endeavouring to extend its boundaries; and in ſo doing, loſt ſight of nature, and adopted their own fancies as improvements upon her ſyſtem, and thus ſunk in ſome meaſure to manneriſts.

It is when the practice of art has become matured by ſkilful men, that others build ſyſtems for their conduct upon the works of their predeceſſors; and though it is very proper that a ſyſtem be acted upon, as it greatly facilitates and improves the practice, yet too ready and ſtrict a reliance upon it is almoſt the certain guide to manner: to avoid which, a conſtant reference to nature is abſolutely neceſſary. Hence, after the period when M. Angelo, Raphael, Titian, and Corregio, lived and exerted their powerful talents in the perfection of the art of painting, ſucceeding artiſts, not endued with their vigour of perception, endeavoured to diſcover in their works ſome means of keeping up with them; to eſtabliſh ſome ſyſtem, on which they had or might have proceeded in their extraordinary and beautiful productions: it thence became as much an object to imitate the works of ſome favourite artiſt as thoſe of nature; and the true intention of the art, being thus but an acceſſory rather than a principal, was too often ſacrificed. Almoſt the whole number of the ingenious men who learned in the ſchool of the Caracci, and followed the principles inculcated there, may be properly termed manneriſts.

The manner, or the eaſe which a ſyſtem gives, of effecting ſomething attractive to the eye, and dazzling to the underſtanding, is too ſeductive to be frequently reſiſted by the inexperienced and vain. Thoſe who have been early taught by ſyſtem to impoſe upon themſelves, and led to imagine they exhibit great ingenuity in managing a pencil with dexterity, will moſt likely never believe that it is more difficult, and far more praiſe-worthy, to think juſtly, and to imitate attentively the preciſe terms of an expreſſion, though it be wrought with a heavier hand, and more laborious ſtudy. Manner, conſidered thus, is a kind of receipt for making a picture, a ready mode of combining the neceſſary ingredients; in which, however, though the hand of the artiſt may ſometimes by accident add a larger or ſmaller proportion of any one of them, the reſult is inevitably of nearly the ſame quality, and is in conſtant danger of being miſapplied: for it is equally as ridiculous to ſuppoſe that one kind of execution or mode of compoſition will ſuit the repreſentation of all kinds of ſubjects, as to believe that one compoſition of medical drugs is adequate to the cure of all kinds of diſeaſes.

Manners, in *Poetry*, denote the inclinations, genius, and humour, which the poet gives to his perſons, and whereby he diſtinguiſhes his characters.

Ariſtotle defines manners to be that which diſcovers the inclination of him who ſpeaks, and ſhews what he will reſolve upon, or what reject, before he was actually determined: whence he concludes, that manners have not place always, and in all kinds of diſcourſes.

One inſtance will make this definition clear. In the firſt book of Virgil, Æneas is repreſented extremely pious, determined to execute the will of the gods, at all adventures. In the fourth book he has a difficult choice propoſed; being engaged, on the one hand, out of a principle of love, gratitude, and honour, not to quit Dido; and having, on the other hand, an expreſs order from the gods to depart for Italy. Now, before it appears on which ſide he has determined, what he has before ſaid ſhould ſhew his will and inclinations, and which part he will take. And thoſe preceding diſcourſes, which diſcover his future reſolution, make what we call the poetical manners.

Thoſe make it paſt doubt he will abandon Dido to obey the gods; this he does in effect; and the manners, therefore, are good, and well conducted. Had he diſobeyed the orders of Jupiter, to ſtay with Dido, the manners had been ill; becauſe they would have foretold a reſolution contrary to what he was really to take. But had there been nothing to make us foreſee any reſolution of Æneas at all, neither that which he actually took, nor the contrary, in that caſe there had been no manners at all. It is the manners, as before obſerved, that diſtinguiſh the characters; and, unleſs the manners be well expreſſed, we ſhall never be acquainted with the perſons at all; nor, conſequently, ſhall we be either terrified with foreſeeing their dangers, nor melted into pity, by ſeeing their ſufferings.

The manners ſhould have four qualities; they ſhould be *good*, *like*, *ſuitable*, and *equal*.

The manners are *good*, when they are well marked or expreſſed; that is, when the diſcourſe of the perſons makes us clearly and diſtinctly ſee their inclinations, and what good or evil reſolutions they will take. *Likeneſs* of manners only relates to known and public perſons, whoſe characters are in hiſtory, with which the poetic characters muſt agree; that is, the poet muſt not give a perſon any quality contrary to any of thoſe which hiſtory has already given him. And here it may be obſerved, that the evil qualities given to princes, and great men, ought to be omitted by poets, if they be contrary to the character of a prince, &c. but the virtues oppoſite to thoſe known vices ought not to be impoſed; as by making him generous and liberal in the poem, who was avaricious in the hiſtory.

The manners muſt likewiſe be *ſuitable*; that is, they muſt be agreeable to the age, ſex, rank, climate, and condition of the perſon that has them. Horace obſerves, "Intererit multum Davuſne loquatur, an heros." Again, the manners muſt be *equal*; that is, they muſt be conſtant, or conſiſtent, through the whole character; or the variety or inequality of the manners, as in nature, ſo in the drama, muſt be equal. The fearful muſt never be brave, nor the brave timorous; the avaricious muſt never be liberal, nor *vice verſâ*. In this part Shakſpeare's manners are admirable.

Beſides theſe four qualities above mentioned, there is a fifth eſſential to their beauty; which is, that they be neceſſary; that is, that no vicious quality, or inclination, be given to any poetic perſon, unleſs it appear to be abſolutely neceſſary, or requiſite, to the carrying on of the action.

MANNERIST, in *Painting*, one who adopts a manner,

ner in his works, or a peculiar and affected mode of producing effect in them unauthorized by nature.

MANNERSDORFF, in *Geography*, a town of Auftria, on the Leytha, celebrated for its medicinal waters; 17 miles S.S.E. of Vienna.

MANNI, Genaro, in *Biography*, compofer of the archiepifcopal church, and a great and much refpected mafter at Naples, in 1770. His ftyle of church mufic much refembles that of Leo, with equal invention and learning. At the death of Jomelli, he formed a plan for a public funeral for that truly great mufician, and had intereft fufficient to have it executed with uncommon folemnity and fplendour. See Jomelli; alfo Genaro.

MANNIFERA Arbor, in the *Materia Medica*, the name by which the round-leaved afh, on which the manna is found, is often called.

MANNIN Bay, in *Geography*, a fmall harbour on the W. coaft of the county of Galway, Ireland, adjoining that of Ardbear, in which latter there is better anchorage and fhelter.

MANNING *a* Hawk, in *Falconry*, the making her tractable and tame.

Manning *the Fleet*, is the providing of it with a fufficient number of men for any expedition. One of the methods commonly recurred to for this purpofe is that of impreffing men, by warrants from the lord high admiral to the captains, which are by them affigned to their lieutenants; and to render this the more effectual, veffels, called *tenders*, are hired into the fervice, to proceed from place to place with thofe officers and prefs-gangs, not only to receive volunteers, but to imprefs any feamen whom they find. The power of impreffing men for the fea-fervice by the king's commiffion, fays judge Blackftone, has been a matter of fome difpute, and fubmitted to with great reluctance; though it hath very clearly and learnedly been fhewn by fir Michael Forfter, that the practice of impreffing, and granting powers, to the admiralty for that purpofe, is of very ancient date and hath been uniformly continued by a regular feries of precedents to the prefent time: whence he concludes it to be a part of the common law. The difficulty arifes from hence, that no ftatute has exprefsly declared this power to be in the crown, though many of them very ftrongly imply it. The ftat. 2 Ric. II. c. 4. fpeaks of mariners being arrefted and retained for the king's fervcie, as of a thing well known and practifed without difpute; and provides a remedy againft their running away. By ftat. 2 & 3 Ph. & M. c. 16. if any waterman, who ufes the river Thames, fhall hide himfelf during the execution of any commiffion of preffing for the king's fervice, he is liable to heavy penalties. By 5 Eliz. c. 5, no fifherman fhall be taken by the queen's commiffion to ferve as a mariner; but the commiffion fhall be firft brought to two juftices of the peace, inhabiting near the fea-coaft, where the mariners are to be taken, to the intent that the juftices may choofe out and return fuch a number of able-bodied men, as in the commiffion are contained, to ferve his majefty; and by 7 & 8 W. III. c. 21. 2 Ann. c. 6. 4 & 5 Ann. c. 19. 13 Geo. II. c. 17, &c. efpecial protections are allowed to feamen in particular circumftances, to prevent them from being impreffed. And ferrymen are alfo faid to be privileged from being impreffed, at common law; all which do moft evidently imply a power of impreffing to refide fomewhere; and, if any where, it muft, from the fpirit of our conftitution, as well as from the frequent mention of the king's commiffion, refide in the crown alone.

But, befide this method of impreffing, which is only defenfible from public neceffity, to which all private confiderations muft give way, there are other means tending to the increafe of feamen, and for manning the royal navy. Parifhes may bind out poor boys apprentices to mafters of merchantmen, who fhall be protected from being impreffed for the firft three years; and if they are impreffed afterwards, the mafters fhall be allowed their wages. (2 Ann. c. 6.) Great advantages in point of wages are given to volunteer feamen, in order to induce them to enter into his majefty's fervice. (1 Geo. II. ftat. 2. c. 14.) It is alfo ufual to promife, by proclamation, a bounty to all feamen and able-bodied landmen, who come into the fervice by a certain time; and every foreign feaman who, during a war, fhall ferve two years in any man of war, merchantman, or privateer, is naturalized *ipfo facto*. 13 Geo. II. c. 3.

About the middle of king William's reign, a fcheme was fet on foot (7 & 8 W. III. c. 21.) for a regifter of feamen, to the number of 30,000, for a conftant and regular fupply of the king's fleet, with great privileges to the regiftered feamen, and, on the other hand, heavy penalties in cafe of their non-appearance when called for; but this regiftry, being judged to be rather a badge of flavery, was abolifhed by 9 Ann. c. 21. Blackft. Com. vol. i. p. 419. &c.

MANNINGTON, a town of America, in Salem county, New Jerfey.

MANNOZZI, Giovanni, in *Biography*. See Giovanni da San Giovanni.

MANNUS, Man, in *Mythology*, the fon of the German god Tuifton; of whom, according to Tacitus De Moribus Germanum, thefe people were defcended.

MANO Armonica, Ital.; *Main Harmonique*, Fr.; *Harmonic Hand*. See Hand, *Harmonic*.

MANOD, in *Geography*, one of the fmaller Philippine iflands. N. lat. 12° 28′. E. long. 122° 24′.

MANŒUVRE, To, in *Military Language*, is fo to manage any body or armed force, as to derive fudden and unexpected advantages before the enemy from fuperior fkill in military movements. It confifts in diftributing equal motion to every part of a body of troops, that the whole may be enabled to form, or change its pofition, in the moft expeditious and beft method, fo as to anfwer the purpofes required of a battalion, brigade, or line of cavalry, infantry, or artillery.

Manœuvres confift chiefly in thofe various movements or evolutions, in which foldiers are exercifed, in order to fit them for defenfive or offenfive operations. See Battalion, Manual and Platoon *Exercifes*, and Review.

The platoon exercife has been altered as well as the manual. (See Platoon and Battalion.) The exercife is performed a little flower, three feconds being allowed between each motion. It is no longer done by fignal, from beat of drum, but all by word of command.

The infantry manœuvres, which were formerly fo numerous, are now reduced to 18; which are ordered to be practifed and performed in every regiment. The following are the movements, explanations of which, and directions for performing them, are given in the books of exercife. See Battalion.

1. Forming the battalion into clofe columns in the rear of the right company. 2. Clofe column in the front of the left company. 3. Clofe column in a central company, facing to the rear. 4. Changing pofition in open column. 5. Throwing back the wings. 6. Changing pofition by a countermarch. 7. Counter-marching by files in the centre of the battalion. 8. Marching in open column. 9. Echellon change of pofition. 10. Taking up a new line by the echellon movement. 11. Changing pofition to right or left. 12. Retreating in line. 13. Marching to a flank in echellon.

on. 14. Forming the hollow fquare. 15. Retiring in line and filing. 16. Advancing in line, filing, and charging to the front. 17. Retreating in line. 18. Advancing in line.

MANOK Manka, in *Geography*, an ifland in the Sooloo Archipelago. N. lat. 4° 54′. E. long. 119° 48′.

MANOMETER is the name of an inftrument in experimental philofophy; it is derived from μανος, *rare*, and μετρον, *meafure*, being intended to meafure the rarefaction and condenfation of elaftic fluids in confined circumftances, whether occafioned by variation of temperature, or by the actual deftruction or generation of portions of elaftic fluid. It is fometimes called *manofcope*.

Mr. Boyle's *ftatical barometer* was an inftrument of this kind; it confifted of a bubble of thin glafs, hermetically fealed, about the fize of an orange, which being counterpoifed when the air was in a mean ftate of denfity, by means of a nice pair of fcales, funk when the atmofphere became lighter, and rofe as it grew heavier. This inftrument would evidently indicate the changes of *denfity* of the atmofphere; but it leaves us uncertain as to the caufe, whether it is from a change of its *weight*, or of its *temperature*, or of both. See Barometer, *Statical*.

The manometer conftructed by Mr. Ramfden, and ufed by Captain Phipps, in his voyage to the North Pole, was compofed of a tube of a fmall bore, with a ball at the end; the barometer being at 29.7, a fmall quantity of quickfilver was put into the tube, to take off the communication between the external air, and that confined in the ball and the part of the tube below this quickfilver. A fcale is placed on the fide of the tube, which marks the degrees of dilatation arifing from the increafe of heat in this ftate of the weight of the air, and has the fame graduation as that of Fahrenheit's thermometer, the point of freezing being marked 32. In this ftate, therefore, it will fhew the degrees of heat in the fame manner as a thermometer. But if the air becomes lighter, the bubble inclofed in the ball, being lefs compreffed, will dilate itfelf, and take up a fpace as much larger as the compreffing force is lefs; therefore the changes arifing from the increafe of heat will be proportionably larger; and the inftrument will fhew the differences in the denfity of the air, arifing from the changes in its weight and heat. Mr. Ramfden found, that a heat equal to that of boiling water, increafed the magnitude of the air from what it was at the freezing point $\frac{404}{1000}$ of the whole. Hence it follows, that the ball and the part of the tube below the beginning of the fcale is of a magnitude equal to almoft 414 degrees of the fcale. If the height of both the manometer and thermometer be given, the height of the barometer may be thence deduced by this rule; as the height of the manometer increafed by 414 is to the height of the thermometer increafed by 414, fo is 29.7 to the height of the barometer.

In the 67th volume of the Philofophical Tranfactions for 1777, page 689, Col. William Roy has given a defcription of the manometers he ufed to afcertain the expanfion and contraction of dry and moift air by change of temperature. "They were of various lengths, from four to upwards of eight feet; they confifted of ftraight tubes, whofe bores were commonly from $\frac{1}{13}$th to $\frac{1}{23}$th of an inch in diameter. The capacity of the tube was carefully meafured, by making a column of quickfilver, about three or four inches in length, move along it from one end to the other. Thefe fpaces were feverally marked with a fine edged file on the tubes, and transferred from them to long flips of pafteboard, for the fubfequent conftruction of the fcales refpectively belonging to each. The bulb attached to one end of the manometer at the glafs-houfe, was of the form of a pear, whofe point being occafionally opened, dry or moift air could be readily admitted, and the bulb fealed again, without any fenfible alteration in its capacity.

"The air was confined by means of a column of quickfilver, long or fhort, and with the bulb downward or upwards, according to the nature of the propofed experiment. Here it muft be obferved, that from the adhefion of the quickfilver to the tube, the inftrument will not act truly, except it be in a vertical pofition; and even then it is neceffary to give it a fmall degree of motion, to bring the quickfilver into its true place, where it will remain in equilibrio, between the exterior preffure of the atmofphere on one fide, and the interior elaftic force of the confined air on the other.

"Pounded ice and water were ufed to fix a freezing point on the tube; and by means of falt and ice, the air was farther condenfed, generally four, and fometimes five or fix degrees below zero. The thermometer and manometer were then placed in the tin veffel, among water, which was brought into violent ebullition; where having remained a fufficient time, and motion being given to the manometer, a boiling point was marked thereon. After this the fire was removed, and the gradual defcents of the piece of quickfilver, correfponding to every 20 degrees of temperature in the thermometer, were fucceffively marked on a deal rod applied to the manometer. It is to be obferved that both inftruments, while in the water, were in circumftances perfectly fimilar; that is to fay, the ball and bulb were at the bottom of the veffel.

"In order to be certain that no air had efcaped by the fide of the quickfilver during the operation, the manometer was frequently placed a fecond time in melting ice. If the barometer had not altered between the beginning and end of the experiment, the quickfilver always became ftationary at or near the firft mark. If any fudden change had taken place in the weight of the atmofphere during that interval, the fame was noted, and allowance made for it in afterwards proportioning the fpaces.

"Long tubes, with bores truly cylindrical, or of any uniform figure, are fcarcely ever met with. Such, however, as were ufed in thefe experiments, generally tapered in a pretty regular manner from one end to the other. When the bulb was downwards, and the tube narrowed that way, the column of quickfilver confining the air lengthened in the lower half of the fcale, and augmented the preffure above the mean. In the upper half, the column being fhortened, the preffure was diminifhed below the mean. In this cafe the obferved fpaces, both ways from the centre, were diminifhed in the inverfe ratio of the heights of the barometers at each fpace, compared with its mean height. If the bore widened towards the bulb when downwards, the obferved fpaces each way from the centre were augmented in the fame inverfe ratio; but in the experiments on air lefs denfe than the atmofphere, the bulb being upwards, the fame equation was applied with contrary figns; and if any extraordinary irregularity took place in the tube, the correfponding fpaces were proportioned both ways from that point, whether high or low, that anfwered to the mean.

"The obferved and equated manometrical fpaces being thus laid down on the pafte-board containing the meafures of the tube; the 212° of the thermometer, in exact proportion to the fections of the bore, were conftructed along fide of them; hence the coincidences with each other were eafily feen; and the number of thermometrical degrees anfwering to each manometrical fpace readily transferred into a table prepared for the purpofe." For the important refults obtained by thefe inftruments, fee Barometer, *Meafurement of Altitudes*.

It

It may not be amifs to obferve that Colonel Roy's refults on the expanfion of dry air have been generally confirmed by the fubfequent experiments of Dalton and Gay Luffac; but thofe on moift air have been found lefs fatisfactory, unlefs in fuch cafes when water in a liquid ftate is prefent. Mr. Dalton has given a theorem, derived from his experience, to afcertain the expanfion of moift air (that is, when water is prefent in the liquid ftate) for any temperature. Suppofing the fpace occupied by the dry air at the given temperature to be 1, the atmofpheric preffure $= p$, and $f =$ the force of fteam at the temperature; then the fpace of the moift air will be $= \frac{p}{p-f}$.

The ftriking peculiarity of manometers of the above conftruction, and that on which their chief excellence depends, is that a mercurial column of about $\frac{1}{15}$th or $\frac{1}{20}$th of an inch in diameter, flides freely up and down a glafs tube, without fuffering any air to pafs either way. This character is, however, obtained only by preferving the tube and mercury very clear and dry. If any duft, moifture, or oxyd be found in the tube, the mercury becomes lefs free in its motion, and the air is apt to break the mercurial column, and gradually efcape. A bore of lefs diameter would occafion too much friction, and one of greater would fuffer the mercury to fall down.

When the expanfion or dilatation of the air in any experiment amounts to one-half of the original volume, or any other quantity exceeding that, a manometer of a ftill more fimple conftruction may be ufed, namely, a ftraight tube, or one without bulb, of the fame bore or capacity as Col. Roy's. It muft be divided into equal fpaces, by means of a fliding mercurial column, on account of the irregularity of the bore incident to fuch tubes; a fmall drop of mercury may then be let down by a clean iron wire to any part of the tube, fo as to conftitute a fliding column of about half an inch in length.

Another fpecies of manometer may be ufed when the object is to meafure the force of fteam or vapour, generated over certain liquids by heat. In this cafe a tube fimilar to the preceding may be bent into a fiphon with parallel legs, the fhorter leg of which muft be clofed, or hermetically fealed, and the longer open. A few drops of the liquid muft be conveyed to the extremity of the clofed leg; after which the greater part of the tube may be filled with mercury, fo as to leave no fpace with air between the mercury and the liquid; the manometer muft then be put into water, &c. of a known temperature, and held in a perpendicular pofture, with the bending loweft, and fo that the extremity of the tube containing the liquid may be wholly immerfed in the warm water, whilft the other extremity is without. The heat will expand part of the liquid into fteam, which will deprefs the mercury in the fame leg, and elevate it in the oppofite, till an equilibrium of preffure is eftablifhed. The elaftic force of the fteam will evidently be equal to the preffure of the atmofphere $\pm$ the difference of the heights of the two mercurial columns in the fiphon, according as the column in the open or clofed leg exceeds that of the other. If the difference of the heights is expected to be upwards of thirty inches, fome inconvenience arifes from the great length of tube requifite: in this cafe an ingenious contrivance has been invented to obviate it; the open end of the manometer muft be hermetically fealed, fo as to inclofe a column of atmofpheric air of due volume; when the fteam is formed in the liquid, and the mercury depreffed, it condenfes the air in the other leg, and the fpace occupied by the condenfed air, as is well known, is inverfely as the force; then the quantity of this force thus afcertained $\pm$ the difference of the two mercurial columns, will give the whole elaftic force of the fteam. Great care muft be taken that the air-column of the fiphon is clear of the liquid that generates the fteam. By this fort of inftrument Mr. Dalton finds the force of fteam from fulphuric ether at 212 Fahr. = 236 inches of mercury. See Manchefter Mem. vol. v. p. 567. Alfo, New Syftem of Chemiftry, part 1, p. 14.

The ftraight tube manometer is the moft elegant and fimple inftrument to prove the important property of elaftic fluids above alluded to, namely, that the fpace occupied by any permanent elaftic fluid is inverfely as the preffure. For this purpofe a fmall given portion of air is confined in the bottom of a long tube, of forty inches or more. A column of twenty-five inches, more or lefs, of mercury is admitted into the tube to confine the air; when the tube is held horizontally, the confined air is preffed by the atmofphere only: when the tube is held perpendicular, the air has the preffure of the atmofphere + that of the mercurial column; and when it is held downwards, the air has the preffure of the atmofphere — that of the mercurial column. By marking the fpaces occupied by the air in thefe circumftances, they are found to be inverfely as the preffures.

Sauffure, in his Effays on Hygrometry, defcribes his manometer: it was nothing but an ordinary barometer: a fimple ftraight tube was filled with boiled mercury, and its open end was immerfed in a cup of the fame liquid; the whole was then inclofed in a large glafs balloon, except a few inches of the upper extremity of the tube, to which a fcale of degrees or equal parts was attached, to fhew the variation of the altitude of the mercury. The tube paffed through a circular hole in a tin plate which covered the opening of the balloon, and which was very carefully luted, as was the paffage of the tube, fo as to be perfectly air-tight. In this cafe it was evident the inftrument was no longer a barometer, as it was cut off from the action of the air out of the balloon; but the mercury was fupported by the fpring or elafticity of the air within the balloon, and muft be fubject to fuch fluctuations as took place in it, independently of any change of weight in the atmofphere. By means of this apparatus, Sauffure found that atmofpheric air, in paffing from extreme drynefs to extreme moifture, in the temperature of 65 Fahr., increafed about $\frac{1}{54}$th in elafticity; and *vice verfâ*, in paffing from extreme moifture to extreme drynefs, it diminifhed $\frac{1}{54}$th in its elaftic force, the temperature being all the time uniform.

MANONOETOC, in *Natural Hiftory*, a name given by the people of the Philippine iflands to a fpecies of horned owl, common in thofe parts.

MANOOR, in *Geography*, a town of Hindooftan, in the province of Dindigul; 27 miles N.W. of Dindigul.

MANOORGUDY, a town of Hindooftan, in the circar of Mahur; 20 miles N. of Neermull.

MANOR, or MANNOR, an ancient lordfhip, or royalty; confifting of demefnes and fervices, and of a court-baron, as incident thereto.

The word is formed from the French *manoir*, a *manfion-houfe*; and that from the Latin *manere*, *to remain or dwell*; as being the lord's ufual place of refidence.

Manor is the fame with what was formerly called *baronia*, *barony*; as it is ftill called *lordfhip*; and lord or baron was empowered to hold a domeftic court, called the "court-baron," for redreffing mifdemefnors and nuifances within the manor, and for fettling difputes of property among the tenants. This court is an infeparable ingredient of every manor; and if the number of fuitors fhould fo fail as not to

leave

leave fufficient to make a jury or homage, that is, two tenants at the leaft, the manor itfelf is loft.

A manor is a kind of noble fee, granted out partly to tenants, for certain fervices to be performed, and partly referved to the ufe of the lord's family; with jurifdiction over his tenant, for the lands, or eftates, held of him. As to the original of manors, we are told there was anciently a certain compafs of ground, granted by the king to fome man of worth, for him and his heirs to dwell upon, and to exercife fome jurifdiction, more or lefs, within that circuit, fuch as he thought good to grant; but performing fuch fervices, and paying fuch yearly rent, as by this grant was required. Now the lord afterwards parcelling the fame to other meaner men, received rent and fervices from them, and by that means, as he became tenant to the king, the inferiors became tenants to him. The fuperior lord, under whom the fmaller manors continue to be held, is called, in fuch cafes, the lord paramount over all thefe manors; and his feignory is frequently termed an honor, not a manor, efpecially if it hath belonged to an ancient feudal baron, or hath been at any time in the hands of the crown. In procefs of time the inferior lords parcelled out and granted to others more minute eftates, to be held of themfelves, and fo downwards without limit; till at length their fuperior lords obferved, that by this method of fubinfeudation they loft all their feudal profits, of wardfhips, marriages, and efcheats, which fell into the hands of thefe mefne or middle lords, who were the immediate fuperior of the "terre-tenant," or occupier of the land; and alfo that the mefne lords themfelves were fo impoverifhed thereby, that they were difabled from performing their fervices to their own fuperiors. This occafioned, firft, that provifion in the 32d chapter of Magna Charta, 9 H. III. (which is not to be found in the firft charter granted by that prince, nor in the great charter of king John,) that no man fhould either give or fell his land, without referving fufficient to anfwer the demands of his lord; and afterwards the ftatute of Weftm. 3, or "quia emptores," 18 Edw. I. c. 1, which directs, that, upon all fales or feoffments of land, the feoffee fhall hold the fame, not of his immediate feoffor, but of the chief lord of the fee, of whom fuch feoffor himfelf held it. But thefe provifions, not extending to the king's own tenants *in capite*, the like law concerning them is declared by the ftatutes of "prerogativa Regis," 17 Edw. II. c. 6, and of 34 Edw. III. c. 15, by which laft all fubinfeudations, previous to the reign of king Edward I., were confirmed; but all fubfequent to that period were left open to the king's prerogative. And from hence it is clear, that all manors exifting at this day, muft have exifted as early as king Edward I.; for it is effential to a manor, that there be tenants who hold of the lord; and by the operation of thefe ftatutes, no tenant *in capite* fince the acceffion of that prince, and no tenant of a common lord fince the ftatute of "quia emptores," could create any new tenants to hold of himfelf.

At this time a manor rather fignifies a jurifdiction, and royalty incorporeal, than the land and fuit: for a man may now have a manor in grofs, *i. e.* the right and intereft of a court baron, with the perquifites, and another enjoy every foot of land belonging to it.

A manor may be compounded of divers things: as of an houfe, arable land, pafture, meadow, wood, rent, advowfon, court-baron, &c. And this ought to be, by long continuance of time, beyond man's memory.

It is held by fome, that a manor cannot now be made, fince a court-baron cannot be made; and without a court-baron, and at leaft two fuitors, there can be no manor. A manor may contain one or more villages or hamlets, or only a great part of a village; and there are capital manors or honors, which have other manors under them, the lords whereof perform cuftoms and fervices to the fuperior lords. There may be alfo cuftomary manors, granted by copy of court roll, and held of other manors. But it cannot be a manor in law, without freehold tenants; nor a cuftomary manor, without copyhold tenants. The cuftom remains, when tenements are divided from the reft of the manor, the tenants paying their fervices; and he who hath the freehold of them may keep a court of furvey, &c. See VILLEIN, COPYHOLD, and TENURE.

MANOR *Courts* are fuch as are held within the manor, for the purpofe of adjufting the various rights, claims, &c. It is obferved that the bufinefs of holding thefe, depends on whether they are held of right, or merely by cuftom. It is added, that "if the *copyhold tenure* is fo far worn out, in any manor, that there are not two ancient or feudal tenants remaining within it, the court has loft its legal power. It cannot by right take cognizance of crimes, nor enforce amerciaments." It is, however, allowed that manorial courts have their ufes, in regulating farm-roads, drift-ways, and water-courfes, and in preventing nuifances of different kinds within a manor, and it is generally right to preferve the cuftom of holding them for thefe purpofes. Where *copyhold courts* remain in force, and where legal forms are to be obferved, they are beft held by a law fteward.

MANOR, in *Geography*, a townfhip of America, in Lancafter county, Pennfylvania, containing 1804 inhabitants.

MANORCOTTA, a town of Hindooftan, in Madura; 15 miles N. of Coilpetta.

MANORE, a town of Hindooftan, in Baglana; 38 miles S. of Damaun.

MANOR-HAMILTON, a fmall poft-town of the county of Leitrim, Ireland, on the road to Sligo; being near 11 miles eaft of that town, and 94 miles N.W. from Dublin.

MANORIAL CLAIMS, the claims which the lords of manors have upon their tenants, and which are different in different cafes, according to the nature of the manor. In refpect to the appropriation of commonable lands, thefe claims fhould, according to a late writer, be regulated by the particular advantages which the lord of a given manor may enjoy, and which he may continue to enjoy, while they remain open and uninclofed, whether they may arife from mines, quarries, water, alien tenants, fuel, eftover, pannage, game, &c. The claims of lords, as guardians of the foil, which is productive of *pafturage* only, is, in moft inftances, merely honorary; and it is for the legiflature to apportion the fhare of lands, to which they are entitled, as an equivalent for fuch. But their claims, in the right of the foil on which *thriving timber* is ftanding, are more fubftantial; as out of thefe, they have in effect a real yearly income, equal to the annual increafing value of the timber; a fort of advantage which they of courfe will continue to enjoy, if the commons remain open and uninclofed, as long as the timber continues to increafe in value. Their claims in this refpect, confequently depend on the quantity of timber, and its ftate of growth, conjointly taken. It is fuppofed that, "young thriving timber, not only affords an annual increafe of value at prefent, but will continue its benefits for many years to come, if it be fuffered to remain undifturbed, or the foil which fupports it, during the eftimated period of its future increafe; whereas dotards and ftinted trees, which afford no increafe of value, do not entitle their owners to any fhare of the foil they ftand upon; the trees themfelves, or their intrinfic value, appear to be all that the lord has a right to claim."

It

It is conceived that the claims of the crown, or of hereditary rangers on foreſt lands, ſhould be ſatisfied on the ſame principle.

MANORPOUR, in *Geography*, a town of Hindooſtan, in Mewat; 25 miles S.W. of Cottilah.

MANOS, a town of the iſland of Cuba; 20 miles E.N.E. of Havannah.—Alſo, a cluſter of ſmall iſlands in the Spaniſh Main, near the coaſt of Darien. N. lat. 9° 17′. W. long. 78° 40′.

MANOSQUE, a town of France, in the department of the Lower Alps, and chief place of a canton, in the diſtrict of Forcalquier, which, before the revolution, was the reſidence of a governor, and contained ſeven churches and a commandery of Malta; near it is a medicinal ſpring; ſeven miles S. of Forcalquier. The place contains 5360, and the canton 11,527 inhabitants. N. lat. 44° 50′. E. long. 5° 51′.

MANOT, a town of Hindooſtan, in Aurungabad; 60 miles E.S.E. of Aurungabad.

MANOU, a kingdom of Africa, E. of Quoja.

MANOUARAN, a ſmall iſland in the North Pacific ocean, near the N. coaſt of Waygoo. N. lat. 0° 6′. E. long. 131° 10′.

MANPOUR, a town of Hindooſtan, in Benares; 12 miles N.W. of Bidzigur.—Alſo, a town of Hindooſtan, in Bahar; 35 miles S.W. of Bahar.—Alſo, a town of Hindooſtan, in Oude; 40 miles S.E. of Gorrackpour.

MANQUES Secas, a cluſter of ſmall iſlands in the Atlantic, near the coaſt of Brazil. S. lat. 2° 25′. W. long. 44° 50′.

Manques *Verdes*, a cluſter of ſmall iſlands in the Atlantic, near the coaſt of Brazil. S. lat. 2° 25′. W. long. 44° 46′.

MANRESA, Minorosa, or *Manxes*, a town of Spain, in Catalonia, which gives name to a viguier, *i. e.* governed by a viguier (*vicarius*) or juriſdiction, ſituated on a river, which ſoon after runs into the L'Obregat; it is defended by a caſtle, and contains ſeveral convents; 25 miles N.N.W. of Barcelona. N. lat. 41° 44′. E. long. 1° 44′.

MANRIQUE, D. Jorge, in *Biography*, a Spaniſh poet of the old ſchool, who has retained, to the preſent period of time, a large ſhare of popularity, and who flouriſhed in the fifteenth century. He is chiefly celebrated for the forty-two ſtanzas upon the death of his father, which are ſo natural, and which, being upon a ſubject that intereſts every breaſt, are read with pleaſure by all perſons from the throne to the friar's cell; they have been frequently reprinted with paraphraſes and commentaries. The other pieces of this poet are to be found in the "Cancionero." It was affirmed by Joam II. of Portugal, that it was as neceſſary for a man to know theſe ſtanzas by heart, as to know the pater-noſter. Gen. Biog.

MANS, Le, in *Geography*, a city of France, and capital of the department of the Sarthe, and chief place of a diſtrict, ſituated at the conflux of the Huiſne and Sarthe. Before the revolution it was the capital of Lower Maine, the ſee of a biſhop, the ſeat of a governor, an electorate, bailiwick, &c. and contained a cathedral, two collegiate, 13 pariſh churches, and 12 religious houſes. It is divided into two parts, one containing 9366, and the other 7855 inhabitants. The canton of the former contains 13,866, and that of the latter 11,534 inhabitants; on a territory of 140 kiliometres, in 16 communes. N. lat. 48°. E. long. 0° 17′.

MANSALA, a town of Sweden, in the province of Nyland; 21 miles N. of Borgo.

MANSAPE, a town of Lower Siam, near the coaſt. N. lat. 13° 15′. E. long. 102° 20′.

MANSARA, a town of Hindooſtan, in Bahar; 13 miles S. of Durbungah.

MANSAROAR, a lake of Thibet, about 115 miles in circumference, whence ſprings the ſouthern branch of the Ganges.

MANSART, Francis, in *Biography*, an eminent French architect, born at Paris in 1598, was ſon of the king's carpenter, and received thoſe inſtructions which led him to eminence, as an architect, from the celebrated Gautier; but for the high rank to which he attained in his profeſſion, he was indebted to the force of his own genius. His taſte and judgment, united with a fertile imagination and ſublime ideas, enabled him to equal the greateſt maſters in his plans; he was, however, too apt to alter his deſigns, and even, in aiming at perfection, to demoliſh what was already not only well done, but ſcarcely to be ſurpaſſed. This character was the means of preventing him the honour of finiſhing the fine abbey of Val-de-Grace, founded by Anne of Auſtria, which he had commenced in 1645, and which, when raiſed to the firſt ſtory, the queen put into other hands, to prevent its deſtruction by him who had reared it. He was employed by the preſident Longueil to build his great château de maiſons, near St. Germain's; and when a conſiderable part of it was erected, he pulled it down again without acquainting the maſter with his intentions. After this, it is to his credit, that he finiſhed it in a very noble ſtyle, and it is reckoned one of the fineſt architectural monuments of that age. A better idea cannot be given of his character than this; Colbert applied to him for a deſign of the principal front of the Louvre, and Manſart produced many ſketches of great beauty, but when told he muſt fix upon one to be invariably followed, if approved, he declined the buſineſs. His laſt great work was the portal of the Minims in the Place Royale; he died in 1666, at the age of ſixty-nine. He is known as the inventor of a particular kind of roof called the *manſarde*. He had a nephew Jules-Hardouin, who was alſo eminent in his profeſſion as an architect, and was educated by his uncle. He became a favourite of Lewis XIV. and was enabled, under his patronage, to realize a large fortune. Some of his principal works were the château de Clagny; the palace of Verſailles; the houſe of St. Cyr; the gallery of the Palais Royal; the palaces of Louis-le-Grand, and des Victoires, and the dome and finiſhing of the "Invalides." He died ſuddenly at Marly in the year 1708.

MANSBY, in *Geography*, a town of Sweden, in Weſt Bothnia, on the Calix; 25 miles W.N.W. of Tornea.

MANSCOE, a bailiwick in Georgia, S. of the Muſcle ſhoals, in the Teneſſee river, remarkable for the mammoth bones found here.

MANSDORF, a town of Pruſſia, in Pomerelia; ſeven miles N. of Marienburg.

MANSE, Mansus, *Manſa*, or *Manſum*, formed *a manendo*, *abiding*, as being the place of dwelling, or reſidence, in ancient *Law-Books*, denotes a houſe or habitation; either with or without land.

Manse, *Capital*, *manſum capitale*, denotes the manor-houſe or lord's court.

Manse, or *Manſus preſbyteri*, is a parſonage or vicarage-houſe, for the incumbent to reſide in.

This was originally, and ſtill remains, an eſſential part of the endowment of a pariſh-church, together with the glebe and tithes. It is ſometimes called *preſbyterium*.

MANSEL, in *Geography*, an iſland in the N.E. part of Hudſon's

Hudſon's bay, between Southampton iſland and the coaſt of Labrador. N. lat. 62 38′.

MANSERET, a town of Spain, in the Aſturia of Oviedo.

MANSFELD, Peter Ernest, *Count de*, in *Biography*, a German ſtateſman and commander: in 1552 he was made priſoner at Ivoy, which place he governed. He afterwards became governor of Luxemburg, where he maintained tranquillity, while the reſt of the Low Countries was in a ſtate of civil war. He had afterwards the entire command of Brabant. He died at the advanced age of 87, in the year 1604. Moreri.

Mansfeld, Ernest, *Count of*, a celebrated general, born in 1585, was the natural ſon of the foregoing Peter Erneſt, count of Mansfeld. He was brought up at the court of the archduke Erneſt, governor of the Low Countries, who ſent him at an early age into Hungary, to learn the art of war under his brother Charles. He ſerved the emperor and the king of Spain in Hungary and the Low Countries, and was legitimated by the former, on account of his bravery. He received ſome ſlights from the Spaniſh government, which cauſed him to quit its ſervice in diſguſt, and he entered into that of the duke of Savoy. He had been brought up in the Catholic religion, but did not ſcruple to enter into the league of the Proteſtant princes againſt the head of the empire, and henceforth he became one of the moſt formidable enemies of the houſe of Auſtria. He was ſent by Frederic, elector palatine, in 1618, into Bohemia, to ſupport the revolters from the authority of the emperor. The Bohemians appointed him grand-maſter of artillery and general of infantry; he took Pilſen, and gained other advantages. After Frederic, who had been elected king, had loſt the battle of Prague in 1620, Mansfeld kept on the war till he was compelled by the ſuperior forces of Tilly to retire into the palatinate. His heroiſm was now every where celebrated, and though lying under the ban of the empire, without eſtate or property of any kind, he had rendered his name ſo famous by his ſpirit of enterprize, and his ſingular faculty of recruiting after loſſes, and keeping the field though often defeated, that he found himſelf courted at the ſame time by the king of France, the French Proteſtants, the kings of Spain and England, and the republics of Holland and Venice. He determined, however, to join the duke of Bouillon, and the reformed party in France, and performed many feats of ſurpriſing valour. When he had diſbanded his troops he viſited France and England, and from the latter country he obtained troops, with which he aſſiſted the prince of Orange to raiſe the ſiege of Breda. In 1625 he returned to Germany, and after ravaging the archbiſhopric of Cologne, joined the king of Denmark in Lower Saxony; a train of ill ſucceſs now purſued him, and he was anxious to try his fortune at Venice; with this view he ſet out, accompanied by twelve officers, although at that time labouring under a ſlow fever. He, however, paſſed through Servia and Boſnia, and arrived in Dalmatia, but with ſuch an increaſe of his diſorder, that he was obliged to ſtop at a village near Zara. There, finding his end approaching, he exhorted his companions to remain true to the liberty of their country, and tranquilly expired in November 1626, at the age of forty-one. He had every quality of a great captain, and he always acted with fidelity and indefatigable zeal in the ſervice of the party whoſe cauſe he eſpouſed. The want of regular authority, and reſources, obliged him to connive at the diſorders committed by his ſoldiers; and his marches were ſometimes ſo deſtructive, that the houſe of Auſtria named him the "Attila of Chriſtendom." Moreri. Mod. Univer. Hiſt.

Mansfeld, in *Geography*, a town of Weſtphalia, in the county of Mansfeld, having a caſtle on a high rock, which was formerly a fortreſs, and the reſidence of the counts of Mansfeld, now in a conſiderably dilapidated ſtate; 36 miles N.N.E. of Erfurt. N. lat. 51 38′. E. long. 11 41′.

Mansfeld, *County of*, a principality of Weſtphalia, bounded by the electorate of Saxony and Querfurt, the dioceſe of Merſeburg and the duchy of Magdeburg, the principalities of Anholt and Halberſtadt, and the county of Stolberg. Its greateſt length is 28, and greateſt breadth 16 miles. Although it is generally mountainous, it affords good corn land and paſturage, with a conſiderable extent of woods, vineyards, chaces, and fiſheries; beſides a ſalt-work and mine, and a ſlate from which copper is extracted. This ſlate bears impreſſions of all kinds of animals, eſpecially of fiſhes. In this county are alſo two lakes, almoſt contiguous and communicating with each other; and yet the water of the one is ſalt, and that of the other freſh and ſweet. Theſe lakes abound with fiſh, which furniſh employment and ſubſiſtence for the adjoining inhabitants. They ſupply alſo a great number of wild-ducks, geeſe, ſnipes, and other water-fowl. The county contains ſeven towns. The prevalent religion is Lutheraniſm, introduced into the country by the activity and zeal of Albert VII., count of Mansfeld. This county is partly a fief of Saxony and Magdeburg. At the peace of Tilſit, the Pruſſian part of this county was annexed to Weſtphalia.

Mansfeld, a town of Pruſſia, in Natangen; 10 miles S.S.W. of Konigſberg.

MANSFIELD, Earl of, in *Biography*. See Murray.

Mansfield, in *Geography*, a market town and pariſh in the wapentake of Broxtow, Nottinghamſhire, England, is ſituated in the foreſt of Sherwood, at the diſtance of 14 miles from Nottingham, and 138 from London. It appears to have been a place of high antiquity; coins of ſeveral Roman emperors have been found in and near the town; and the recent diſcovery of ancient relics near Mansfield Woodhouſe is an indiſputable proof that the Romans had a ſtation or ſettlement in this vicinity. In the Domeſday ſurvey "Maunsfield," as it was anciently called, is mentioned as a royal manor; and ſucceſſive monarchs have granted ſeveral privileges to it. A market was eſtabliſhed by a charter of Henry III.; and a fair by a grant from Richard II. When Sherwood foreſt was a royal chace, here was a royal villa which the ſovereigns kept as a hunting ſeat; and, to uſe the words of an old inquiſition, "Henry Fauconberge held the mannor of Cuckney, in ſerjeantry by the ſervice of ſhoeing the king's palfrey when the king came to Mansfield." Leland's account of this place is not very favourable; he calls it "a little pore ſtreet, a thoroughfare at the end of the wood;" but at preſent it is a large and opulent town; the houſes, which are in general well built, were ſtated in the population return of the year 1800, to be, in number, 1245, and occupied by 5998 perſons. The market, which is held on Thurſdays, is generally well ſtocked with corn and cattle; and here are now three annual fairs, chiefly for cattle and cheeſe. Several conſiderable manufactories are eſtabliſhed here; a great trade in free-ſtone is carried on with Nottingham; and the malting buſineſs is very extenſive. The church is a commodious ſtructure; and here is a reſpectable free-ſchool, with two ſcholarſhips at Jeſus college, Cambridge, founded by queen Elizabeth in the third year of her reign.

At the diſtance of a mile and half from the town, is the townſhip and chapelry of Mansfield Woodhouſe, which contains

tains 211 houfes, and 1112 inhabitants. In the year 1786, Hayman Rooke, efq. of this place difcovered, within about a mile from the village, two Roman villæ, which he called Urbana and Ruftica; the former containing nine rooms, the latter thirteen; with hypocaufts, baths, and other appendages: the walls of moft of the rooms appeared to have been ftuccoed, and painted in ftripes of various colours; and in the centre-room of the Urbana was a teffellated pavement. Mr. Rooke alfo found the remains of two Roman fepulchres, with urns, bones, &c.: and various fragments of pateræ and pots of Roman ware, with other relics of antiquity, were difcovered in the rooms of the villæ.

Within a few miles from Mansfield are feveral magnificent manfions, *viz.* Workfop, the feat of the duke of Norfolk; Clumber, the duke of Newcaftle's; Thoresby, lord Newark's; and Welbeck, belonging to the duke of Portland. In popular language this part of the country is called the dukery, from the number of feats belonging to dukes. Hiftory of Nottinghamfhire, by Thoroton and Throfby, three vols. 4to. 1797.

MANSFIELD, a townfhip of America, in Suffex county, New Jerfey, fituated on Muffonenunk river, about feven miles S.E. of Oxford, and containing, in 1790, 1482 inhabitants.—Alfo, a townfhip in Briftol county, Maffachufetts, 29 miles foutherly of Bofton, incorporated in 1770, and containing 1016 inhabitants.—Alfo, a townfhip in Chittenden county, Vermont, between La Moille and Onion rivers, about feven miles from each, and 183 miles N. by E. from Bennington. Mansfield mountain rifes in this town. Its inhabitants are 12.—Alfo, a townfhip in Burlington county, New Jerfey, on the S. fide of Black's creek, confifting of 19,000 acres of excellent foil, noted for its fine paftures and large dairies; eight miles W. by N. from Burlington. The inhabitants are for the moft part Friends —Alfo, a townfhip in Windham county, Connecticut, about 30 miles N. of New London; containing 2560 inhabitants.

MANSIATRE, a river on the W. coaft of Madagafcar, which runs into the ftrait of Mozambique. S. lat. 19° 45′.

MANSIELLA, a town of Spain, in the province of Leon; 10 miles S.E. of Leon.

MANSION, MANSIO, *a manendo*, a dwelling-houfe, or habitation, efpecially in the country.

Among the ancient Romans, *manfio* was a place appointed for the lodging of the princes, or foldiers, in their journey; and in this fenfe we read *primam manfionem*, &c. It is with us moft commonly ufed for the lord's chief dwelling-houfe within his fee; otherwife called the capital meffuage or manor place: and manfion-houfe is taken in law for any houfe or dwelling of another; in cafe of committing burglary, &c.

MANSIO, or *Manfus*, was fometimes alfo ufed in the fame fenfe with hide: that is, for as much land as one plough could till in a year.

MANSLAUGHTER, in *Law*, is a fpecies of felonious homicide, and denotes the unlawful killing of a man, without any malice, either exprefs or implied; which may be either voluntarily, upon a fudden heat; or involuntarily, but in the commiffion of fome unlawful act. (1 Hal. P. C. 466.) As when two perfons, who before meant no harm to one another, falling out on fome fudden occafion, the one kills the other; this is voluntarily manflaughter. But in this and every other cafe of homicide upon provocation, if there be a fufficient time for paffion to fubfide, and reafon to interpofe, and the perfon provoked afterwards kills the other, this is deliberate revenge, and amounts to murder. (Foft. 296.) Thus, if a man takes another in the act of adultery with his wife, and kills him directly upon the fpot; though this was allowed by the laws of Solon, as likewife by the Roman civil law, (if the adulterer was found in the hufband's own houfe,) and alfo among the ancient Goths; yet in England it is not abfolutely ranked in the clafs of juftifiable homicide, as in the cafe of a forcible rape; but it is the loweft degree of manflaughter; and therefore in fuch a cafe the court directed the burning in the hand to be gently inflicted, becaufe there could not be a greater provocation. (1 Hal. P. C. 486. Sir T. Raym. 212.) Manflaughter, therefore, on a fudden provocation differs from excufable homicide *fe defendendo* in this; that in one cafe there is an apparent neceffity for felf-prefervation, to kill the aggreffor; in the other no neceffity at all, being only a fudden act of revenge. Farther, if two perfons play at fword and buckler, unlefs by the king's command, and one of them kills the other, this is *involuntary* manflaughter, becaufe the original act was unlawful. (3 Inft. 56.) So where a perfon does an act, lawful in itfelf, but in an unlawful manner, and without due caution and circumfpection; as when a workman flings down a ftone or piece of timber into a ftreet, and kills a man; this may be either mifadventure, manflaughter, or murder, according to the circumftances attending it: if it were in a country village, and he calls out to all people to have a care, it is mifadventure only; but if it were in London, or other populous towns, where people are continually paffing by, it is manflaughter, though he gives loud warning (Kel. 40.); and murder, if he knows of their paffing, and gives no warning at all; for then it is malice againft all mankind. (3 Inft. 57.) The crime of manflaughter amounts to felony, but within the benefit of clergy; and the offender fhall be burnt in the hand, and forfeit all his goods and chattels. By a law of king Canutus, if a man is killed openly and premeditatedly, the murderer fhall be committed to the relations of the deceafed; but if on his trial the fact be proved, and not to have been wilful, the bifhop is to judge him. There is a manflaughter punifhable as murder, by ftatute; by 1 Jac. I. cap 8. if any perfon fhall ftab another, not having then a weapon drawn, or not being ftricken firft, fo that he dies within fix months, although it were not of malice afore-thought, it is felony without benefit of clergy; but this doth not extend to perfons ftabbing others *fe defendendo*, or by misfortune, &c. with no intent to commit manflaughter; and the ftatute relates to the party only that actually gave the ftroke, or ftabbed the other, and not to thofe that were aiding or abetting. Blackft. Com.

MANSLE, in *Geography*, a town of France, in the department of the Charente, and chief place of a canton, in the diftrict of Ruffee; 12 miles N. of Angoulefme. The place contains 1230, and the canton 14,536 inhabitants, on a territory of 269½ kiliometres, in 25 communes.

MANSO GIAMBATISTA, in *Biography*, marquis of Villa, an eminent patron of polite literature, was born at Naples in 1561. He was brought up to the profeffion of arms, and, in the early part of life, ferved in the armies of the duke of Savoy, and in thofe of the king of Spain. After his return to Naples he devoted his time to literature, of which he was a cultivator and patron. He founded at Naples the academy Degli Oziofi, which held its firft affemblies in his houfe. He was the friend of Taffo, who has infcribed his dialogue on friendfhip with the name of Manfo: he patronized the poet Marino, and honoured the memories of each of them with a biographical eulogy. The great Milton was known to him, and treated by him with much kindnefs. He praifed him very highly in a Latin diftich, though at that time only a young man, and in the infancy of his fame. Milton repaid his civilities by addreffing to him a Latin eclogue entitled "Manfus," which is thought to be one of his beft performances in that language. The works of Manfo are chiefly of the light and amatory kind. He was the principal promoter of the college of Nobles in Naples, to which, at his death, he left all his property. Moreri.

MANSORA, in *Geography*, a town of Arabia, in the province of Yemen, and government of Hodsjerie; 18 miles E.S.E. of Taës.

MANSORA, or *Manfoura*, a town of Egypt, on the right bank of the eaftern branch of the Nile, built as a bulwark againft the Chriftians. The Chriftians of Syria, fettled here, are the chief traders; and the principal articles are the fine rice growing round the lake, and fal ammoniac. Here are alfo large chicken ovens. A canal is made from the Nile to the lake Manzaleh. Dr. Pocock fuppofes that Manfora was the ancient Tanis or Zoan of fcripture; 24 miles S.S.W. of Damietta. N. lat. 31°. E. long. 31° 36′.

MANSORA, a town of Africa, in the kingdom of Fez, near the fea-coaft on the river Guir; 60 miles W. of Mequinez.

MANSORAH, or MANSURAH, the fame with Bhakor or *Bekker*; which fee.

MANSORIUS MUSCULUS, in *Anatomy*, a name given by fome writers to that mufcle of the face more generally known under the name of the maffeter.

MANSOURAH, in *Geography*, a ruined town of Algiers, without walls and inhabitants; 12 miles E. of Boujeiah.—Alfo, a river called Sifaris, which runs into the fea; 18 miles E. of Boujeiah.

MAN-STEALING, in *Law*. See KIDNAPPING.

MANSTEIN, CHRISTOPHER HERMAN DE, in *Biography*, a military commander and writer of memoirs, was born at Peterfburg in 1711. He obtained the rank of captain of grenadiers in the Ruffian fervice, and, foon after the death of Anne, was commiffioned to arreft the regent Biren and his family. For this fervice he was rewarded with the rank of colonel, and with an eftate in Ingria. Of both thefe he was deprived on the acceffion of Elizabeth to the throne of Ruffia, and he then, without hefitation, entered into the Pruffian army as a volunteer, obtained confiderable promotion, and was killed by a mufket-fhot in the year 1756. He is known as a writer by "Memoirs of Ruffia, hiftorical, political, and military, from the Year 1727 to 1744," written in the French language. Thefe were fent by the earl marfhal Keith to David Hume, tranflated into Englifh, and publifhed in 1770. They were afterwards publifhed in French at Lyons in two vols. 8vo. They are reckoned valuable as a fair and authentic narrative of the important events which happened during that period, and they are efteemed as remarkably accurate in their accounts of military tranfactions.

MANSUM, in *Geography*, a river of Africa, on the Gold Coaft, which runs into the Atlantic; five miles W. of Frederickfburg.

MANSURA, a town of the Arabian Irak, feated on the Euphrates; 110 miles W.N.W. of Baffora.

MANSURCOTTA, a town of Hindooftan, in the circar of Cicacole; eight miles S.S.W. of Ganjam.

MANSURIA, an ifland in the river Nile; 25 miles N. of Syene.—Alfo, a town of Arabia, in the province of Yemen; eight miles N. of Beit el Fakih.

MANSWORTH, a town of Auftria; nine miles S.E. of Vienna.

MANTA, LA, a town of France, in the department of the Stura, fituated between the Maritime and Cottian Alps; with a caftle placed on an eminence near the town. The gardens are filled with trees of citrons, oranges, and myrtles, and tender plants not capable of enduring the other parts of Piedmont; two miles S. of Saluzzo.

MANTA *Bay*, a bay of the Pacific ocean, on the coaft of Para, about 20 miles S. of the equator, famous formerly for a pearl fifhery, which has been difcontinued, and deriving its name from a multitude of large fifhes called mantas, in the capture of which the adjacent inhabitants are employed.

MANTALINGA, a town of the ifland of Sibu, one of the Philippines, inhabited by natives, exempted from tribute, becaufe they firft acknowledged the fovereignty of the Spaniards.

MANTANNARE, a fmall ifland in the Eaft Indian fea, near the N.W. coaft of the ifland of Borneo. N. lat. 6° 38′. E. long. 116° 27′.

MANTARO, a river of Jauja, fo called from the province it pervades, joins the Maranon at 12° 6′, and ferves to propel the chief river towards the N.E.; the courfe having formerly been towards the N.W. See MARANON.

MANTECU, a fort of preparation of butter ufed by the Turks when they travel with their caravans. This is firft boiled over the fire, and then falted and kept in veffels made of tough leather, worked round a wooden frame, of the fame fhape with the veffels in which they bring their balfam from Mecca.

MANTEGAR, or MAN-TIGER, as it is fometimes written, in *Zoology*, is the tufted ape, with a nofe and head fourteen inches long; the nofe of a deep red, face blue, and both naked; black eye-brows; ears like the human; on the top of the head is a long upright tuft of hair; and on the chin another; two long tufks in the upper jaw; fore-feet like hands, and the nails on the fingers flat; the hind-feet have the thumbs lefs perfect, and the nails imbricated; the fore-part of the body and the infide of the legs and arms naked; the outfide covered with mottled brown and olive hair; that on the back dufky; the buttocks red and bare; and the length from the nofe to the rump three feet two inches. This animal is very fierce and falacious; will fit on its rump, and fupport itfelf by a ftick; and in this attitude hold a cup in its hand, and drink out of it; its food is fruit. Pennant. See SIMIA *Mormon*.

MANTEGNA, ANDREA, in *Biography*, born at Padua, or in its diftrict, of low parents, in 1431, became the pupil of Squarcione, who was fo deeply ftruck with his talents that he adopted him for his fon. He repented of it when Andrea married a daughter of Jacopo Bellini, his competitor. But the cenfure, which now took place of the praife he had before lavifhed on his pupil, only added to his improvement. Certain baffo-relievos of the ancient Greek ftyle, poffeffed by the academy in which Andrea ftudied, captivated his tafte by the correctnefs of their outline, the fimplicity of the forms, the parallelifm of the attitudes, and ftrictnefs of the drapery: the dry fervility with which he copied thefe, fuffered him not to perceive that he had loft the great prerogative of the originals, the foul that animates them. The farcafms of Squarcione on his picture of St. Jacopo, made him fenfible of the neceffity of expreffion and character: he gave more life to the figures in the ftory of St. Chriftophoro; and in the face of St. Marco, in the church of St. Giuftina, united the attention of a philofopher with the enthufiafm of a prophet.

The

The criticifms of Squarcione improved Mantegna in expreffion, the friendly advice of the Bellini directed his method and fixed his principles of colour. During his fhort ftay at Venice he made himfelf mafter of every advantage of that fchool, and in fome of his pictures there are tones and tints in flefh and landfcape of a richnefs and zeft equal to the beft Venetians of his day. Whether he taught the Bellini perfpective is uncertain: Lomazzo affirms, that "Mantegna was the firft who opened the eyes of artifts in that branch."

The chief abode and the fchool of Mantegna were at Mantua, where, under the aufpices of Marchefe Lodovico Gonzaga, he eftablifhed himfelf, with his family; but he continued to work in other places, and particularly at Rome, where the chapel which he had painted for Innocent VIII. in the Vatican exifted, though injured by age, at the acceffion of Pius VI The ftyle of thofe frefcoes proved that he continued fteady in his attachment to the antique; but that from a copyift he was become an imitator.

Of his works in oil, Mantua poffeffes feveral; but the principal one, the mafterpiece of the artift, and the affemblage of his powers, the picture called La Virgine della Vittoria, painted for J. F. de Gonzaga, Marchefe di Mantua, in honour of a victory he gained over the French upon the banks of the Taro, and afterwards placed in the Oratorio de Padri di S. Felippo, is now among the fpoils of the Louvre. The Madonna is feated on her throne with the infant ftanding on her lap, and giving benediction to the kneeling marquis in arms before her. At one fide of the throne ftands the archangel Michael, holding the mantle of the Madonna; at the other St. George, St. Maurice, John the Baptift, and St. Elizabeth on her knees. The fide of the throne is ornamented with figures relative to the fall of Adam: the fcene is a leafy bower peopled by birds, and here and there open to a lucid fky.

No known work of Mantegna equals, in defign, the ftyle of this picture: they generally fhew him dry and emaciated: here he appears in all the beauty of felect forms: the two infants and St. Elizabeth are figures of dignity, fo is the archangel, who feems to have been, by the conceit of his attitude, and the care beftowed upon him, the painter's favourite object. The head has the beauty and the bloom of youth; the round flefhy neck and the breaft, to where it confines with the armour, are treated with great art; the expreffion is, to a high degree, fpirited and characteriftic. The countenance of the Madonna is mild and benign; that of Chrift, humane. The future prophet is announced in the uplifted arm of John. The guardian angel kindly contemplates the fuppliant, who prays with devout fimplicity. The whole has an air of life. All the draperies, efpecially that of St Elizabeth, are elegantly and correctly folded: with more mafs and lefs interfection of furfaces they would be perfect.

The extreme finifh of execution, as it has not here that drynefs which disfigures moft other works of this mafter, does not impair the brilliancy of colour. The heads of the Madonna, of the infant, of St. Michael, have a genial bloom of teints. The lights are every where true, the fhades alone are fometimes too grey, or too impure. The general fcale of the light has more ferenity than fplendour, more the air of nature than of art, but the reflexes are too often cut off too glaringly from the opaque parts. The whole of the picture has preferved its tone to this day, is little damaged, and in no place retouched.

Of the remainder of Mantegna's works, befides fome frefcoes of confiderable merit, but much injured, in a faloon of the caftle of Mantua, and the well known Triumph of Cæfar, in various compartments at Hampton Court, little now remains. His name is more frequent in galleries and collections than his hand: lanknefs of form, rectilinear folds, yellow landfcape, and minute polifhed pebbles, are lefs genuine figns of originals, than correctnefs of defign and delicacy of pencil. It is not probable that a man fo occupied by large works, and fo much engraving, fhould have had time to finifh many cabinet pictures: the feries of his plates confifts of upwards of fifty pieces, executed by his own hand, and though he was not the inventor of the art, he was certainly the firft engraver of his time.

Andrea had great influence in the ftyle of his age, nor was the imitation of his ftyle confined to his own fchool: Francefco, and another of his fons, finifhed fome of the frefcoes which he had begun in the caftle, and added the beautiful ceiling, which fhews that the fcience of forefhortening what the Italians call "del fotto in fu," though Melozio be its reputed author, was carried much farther by Mantegna and his followers. He died in 1505, aged 74. Fufeli's Pilkington.

MANTEIGAS, in *Geography*, a town of Portugal, in the province of Beira; 27 miles S.E. of Vifeu.

MANTELETS, in *Military Language*, a kind of moveable parapets, made of planks about three inches thick, nailed one over another to the height of almoft fix feet, generally cafed with tin, fet upon little wheels, and guided by a long pole; fo that in a fiege they may be driven before the pioneers, and ferve as blinds, to fhelter them from the enemy's fmall fhot.

There are alfo other forts of mantelets, covered on the top, of which the miners make ufe to approach the walls of a town or caftle. See *Plate* VI. *Fortification*, *fig.* 9.

The double mantelets form an angle, and ftand fquare, making two fronts, which cover both the front and flank of the fappers, &c. when at work: thefe have double planks, with earth rammed in between them; they are five feet high, and three in breadth, fometimes covered with plates of iron.

It appears from Vegetius, that mantelets were in ufe among the ancients under the name of vineæ; but they were built flighter and much larger than our's, being eight or nine feet high, as many broad, and fixteen long; they were defended by a double covering, the one of boards, the other of faggots, with the ribs of ofiers; and were cafed without with fkins, fteeped in water, to prevent fire.

MANTERA, in *Geography*, a fmall ifland in the Atlantic, near the coaft of Africa. N. lat. 10 45'.

MANTES, a town of France, and principal place of a diftrict, in the department of the Siene and Oife, feated on the Seine, over which is a bridge of thirty-fix arches. The place contains 4300, and the canton 13,803 inhabitants, on a territory of $132\frac{1}{2}$ kilometres, in 23 communes. N. lat. 48° 59'. E. long. 1° 48'.

MANTICA, in *Zoology*, the name by which Pifo and fome other writers have expreffed the pouch or bag of fkin under the belly of the opoffum, into which the young are received in time of danger.

MANTICLUS, in *Mythology*, a name given to Hercules under which title he had a temple without the walls o Meffina, in Sicily. This temple was built by Manticlus the chief of a colony of Meffenians, about 664 years before Chrift: or, as others fay, the leader of a colony which fettled in the ifle of Zacinthus, now Zante. Pautan. in Meffen.

MANTICORA, in *Natural Hiftory*, a genus of infects of the order Coleoptera, of which there is but a fingle fpecies. The generic character is, Antennæ filiform, the

joints

joints cylindrical; four feelers which are filiform, the thorax is rounded before, and emarginate behind; the head is projecting, and the mandibles are exserted; the shells are united; it has no wings.

Species.

Maxillosa. Body large and black; head subglobular, impressed on each side; mandible toothed at the inner base; thorax impressed in the middle, and elevated behind; the margin rounded and notched at the tip; shells above, flat, rough, deflected at the edge, with a very sharp lateral serrate line; legs simple and black. It is described by M. Olivier, in his "Histoire Naturelle des Insectes," as inhabiting the Cape of Good Hope.

MANTINEA, in *Ancient Geography*, a town of Arcadia, E. of the river Ophis, and N. of Pallantium. This town, in the time of Homer, appears to have been considerable. Antinoe, the daughter of Cepheus, is said to have transported the inhabitants of the old city to a more convenient situation than that which it originally occupied to the banks of the river Ophis; and it is fabulously reported that Antinoe was led to the selection of the spot on which the New Mantinea was erected under the guidance of a serpent, whilst others say that the river derived its name from its winding or serpentine course. After the peace of Antalcidas, so called because he was the ambassador employed by the Greeks in negociating it with the king of Persia, in the year 387 B.C., the Lacedæmonians, under the conduct of their king Agesipolis I., laid siege to Mantinea, as a punishment of its inhabitants for having taken part with the Athenians in the preceding war. Having defended themselves with invincible courage during the summer, the Lacedæmonians availed themselves of the approach of winter by damming up the current of the river, which was thus made to overflow its banks and overwhelm the houses of Mantinea, upon which the inhabitants were constrained to abandon the noble city which they had long occupied, and to retire to their old villages. After the battle of Leuctra, in the year 370 B.C. the Mantineans returned to their city and rebuilt it, deriving assistance in the undertaking from the Thebans: but they afterwards took part with the Lacedæmonians against their coadjutors. A battle was fought near Mantinea by the combining powers, in which, though the Thebans were victorious, they lost their famous general, Epaminondas. Some time after the formation of the Achæan league, Aretas made himself master of Mantinea: but the Achæans were defeated in a subsequent battle by the Lacedæmonians, under the command of Cleomenes, who took several of their cities, and they were reduced to the necessity of seeking the succour of Antigonus, king of Macedon. Thus aided and encouraged, the Achæans obliged Cleomenes to retire with great precipitation to Mantinea. But he was soon constrained to abandon it to the force brought against him by Antigonus, who took possession of it without any great resistance. The Mantineans, in compliment to Antigonus, suppressed the original name of their city, and called it "Antigonia," by which appellation it was distinguished till the time of Adrian, who caused it to resume its ancient name of Mantinea. Pausanias has particularly described this famous city and its magnificent temples. The first was a large edifice, separated into two parts by a high wall; on one side of which was the statue of Æsculapius by Alcamenes, and on the other that of Latona with her children, by the celebrated Praxiteles. Elevated upon a column was a statue of the historian Polybius, who rendered signal service to the Achæans in their wars with the Roman republic. Another temple was that of Ceres and Proserpine, in which was a sacred fire which was kept continually burning. The temple of Juno was situated near the theatre, and the goddess was seated on a throne of ivory, having on both sides of her Minerva and Hebe, all which were the works of Praxiteles. Near the altar was the tomb of Arcas, son of Calisto and grandson of Lycaon. Another temple which disgraced the city was dedicated to the infamous Antinous, who contributed to the licentious debauchery of Adrian. From the centre of the town five roads passed in different directions to the principal places of Arcadia.

MANTINERA, in *Geography*, a small island in the Mediterranean, near the coast of Naples. N. lat. 39° 55'. E. long. 13° 52'.

MANTIS, in *Natural History*, a genus of insects of the order Hemiptera, of which there are sixty-four species scattered over the globe, but none of them are found in this country: two or three of them are worshipped by the Hottentots, as the ibis and ichneumon were of old by the Egyptians.

The generic character is, Head unsteady; mouth armed with jaws; feelers filiform; antennæ setaceous; thorax linear; wings four, which are membranaceous and convolute, the under ones plaited. The fore-legs are compressed, serrated beneath, and armed with a single claw, and lateral jointed process; the hind-legs are smooth, and formed for walking. This is thought to be one of the most singular genera in the whole class of insects, and the imagination can hardly conceive shapes more strange than those exhibited by some particular species.

Species.

Filiformis. Body, as its name imports, is filiform, apterous, and brown; the legs are longer than the body, unarmed. The antennæ are black, and it inhabits South America.

Ferula. Body is filiform, apterous, and green; the legs are longer than the body; the hind thighs are spinous at the tip. It inhabits Guadaloupe: it is large, long, and filiform. The antennæ are of a moderate size, green tipt with brown; body smooth glabrous, without wing-cases; thighs angular; the four hind ones spinous.

Calamus. Body filiform, apterous, greenish; thighs striate. Antennæ yellowish; head smooth yellowish; body cylindrical; legs yellowish; the thighs are striate, with raised lines. It inhabits Santa Cruz in America.

Rossia. Body filiform, apterous, green; thighs toothed; the legs are short and brown, the thighs are toothed beneath. It is found in many parts of Italy.

Angulata. This species is apterous: the head and thorax spinous; wing-cases rounded, very short; thighs angular beneath. This is sometimes denominated the "Mantis gigas," and is an inhabitant of Guadaloupe. The body is of a chesnut brown; the head has two spines and numerous raised dots; thorax with two sharp spines on the anterior lobe, and numerous raised dots, the sides serrate; wing-cases short, rounded, reticulate; thighs very angular, the four hind ones spinous beneath.

Gigas. Thorax rough and roundish; wing-cases very short; legs spinous: with respect to colour, the thorax is speckled with green; the wing-cases are reticulate, the base and tip green, pale in the middle; wings pale with transverse brown bars. It inhabits Amboina.

Cylindrica. Thorax cylindrical; fore-legs united to the fore-part of the thorax; wing-cases grey, the base and beneath rufous; the wings are brown dotted with white.

Its

Its habitation is not clearly afcertained, but it is not found in Europe.

Phthisica. Thorax roundifh, muricate; the wing-cafes are very fhort; the legs are unarmed. It inhabits South America and India.

Necydaloides. In this fpecies the thorax is rough; wing-cafes ovate, angular, very fhort: the wings are oblong. It is found in many parts of Afia The wing-cafes have a raifed flexuous line down the middle; the wings are brown, and as long as the abdomen.

Atrophica. Thorax four-fpined; wing-cafes very fhort, mucronate at the bafe. It inhabits Java. The head is unarmed; the wing-cafes are ovate, truncate at the tip.

Spinosa. Head and thorax fpinous; wing-cafes very fhort and acute. It is found in India. The antennæ are as long as the body; the thorax is brown, rough, with a double fpine each fide on the fore-part; wing-cafes brown; wings brown, convolute, as long as the abdomen; fore-thighs unarmed, the reft fpinous.

Bispinosa. Thorax is rather round, with two fpines on the fore-part; wing-cafes very fhort; wings rofe colour. It inhabits America. The colours of this fpecies are very fine; the antennæ are yellowifh: the head is green, with a fhort fpine each fide on the crown; thorax green, yellowifh on the back; wing-cafes green, ftriate with black; wings large, rofy, the outer margin green; abdomen linear, yellowifh, green at the tip; the legs are fpinous.

Jamaicensis. This, agreeably to its fpecific name, is found in the ifland of Jamaica; and it differs from the laft only in having no fpines on the thorax.

Lateralis. Linear and black; the wing-cafes are very fhort, gibbous, and yellowifh at the fides; the antennæ longer than the body, black; thorax yellowifh at the fides; wing-cafes with a raifed tooth in the middle; wings large, black, edged with yellow; the legs are black. It inhabits Brafil.

Aurita. The head and thorax are fpinous; and the wing-cafes have a fub-compreffed tubercle in the middle. It is found in the Eaft Indies. The antennæ are as long as the body, varied with black and white; head brown, with numerous fharp fpines; thorax brown and fpinous; wing-cafes concave and very fhort; the wings are large and dufky, with a broad pale rufous border on the outer edge, fpotted with black, and marked with a broad white band.

Linearis. Linear, brown; wing-cafes very fhort, fubfpinous at the bafe; antennæ as long as the body; wings long and brown; fore-thighs membranaceous. It inhabits the Eaft Indies.

Rosea. This fpecies is linear and green; front fulvous; wing-cafes very fhort; and the wings are rofy, with a green rib; antennæ longer than the body, brown, with three or four white rings; thorax fmooth, linear, greenifh; wing-cafes vaulted with a black thick fpine in the middle; the wings are ftriate, and the legs yellow.

Flabellicornis. Thorax dilated and membranaceous at the tip; fore-thighs terminating in a fpine, the reft in a lobe; antennæ pectinate: thefe are large, very much feathered and fetaceous at the tip; the front is projecting, narrower in the middle, notched at the tip; wing-cafes and wings longer than the body, dufky, fub-pellucid and dilated at the anterior margin. It inhabits Tranquebar.

Gongylodes. This is one of the moft remarkable of the Mantis genus: from the thinnefs of its limbs, and the grotefque form of its body, efpecially in its dried ftate, it feems to refemble the conjunction of feveral fragments of withered ftalks; which is the cafe alfo of the larvæ of many of the genera, before the wings are formed. The thorax is uncommonly long and narrow; the head is fmall and flat, with two filiform antennæ; behind thefe, two large polifhed eyes are placed; the roftrum has the fhape of an awl, but it is often fplit towards the extremity into two points; the elytra, which cover two-thirds of the body of the infect, are reticulated, and croffed over one another; the wings which they cover are veined and diaphanous; the four hind-legs have the appearance of being winged, on account of thofe large membranous lobes which emerge from their joints; the anterior pair are armed with fpines at their firft articulation, and towards their extremities they are ferrated on one fide. It inhabits various parts of Africa and Afia.

Pauperta. Thorax is linear and fpinulous; fore-thigh terminating in a fpine, the others are lobate. It is found in Coromandel, and alfo in fome parts of Portugal.

Mendica. Thorax margined, toothed; wing-cafes varied with white and green; the margin is dotted with white. It inhabits Alexandria. The head is yellowifh; front horned; legs yellowifh.

Truncata. Thorax dilated each fide at the tip, yellowifh; the wings are black at the bafe, and tipt with white. This is a fmall infect, and inhabits Cayenne. The thorax is linear, rough, membranaceous, and flightly crenate at the tip; abdomen fhort, flat, dilated; wing-cafes as long as the abdomen, and yellowifh, with a brown callous dot in the middle.

Strumaria. This is a green infect. The thorax is much dilated in its whole length; wing-cafes and wings are longer than the abdomen; the body is fhort; and the abdomen yellowifh. It is found in South America.

Tricolor. The fides of the thorax are expanded, lobate; head horned; fore-legs very broad. It inhabits India. The eyes of this fpecies are very remarkable, terminating in fharp ear-like horns; wing-cafes pale, fpotted with white; wings red at the bafe, brown in the middle, and tipt with white.

Cancellata. Thorax dilated at the fides, membranaceous, and flat; the body is of a dull brown colour; the thorax is flat.

Siccifolia. The thorax is denticulate; the thighs are oval and membranaceous. It inhabits India. The infects of this fpecies are ufually denominated walking leaves, from their exact refemblance in colour and fhape to a dried leaf. They have no wings, or, at moft, mere rudiments; the firft two pair of thighs are ferrate, the others fimple; the body is very much dilated and rounded.

Pecticornis. Thorax fmooth; crown fubulate; antennæ pectinate. It inhabits Jamaica.

Oculata. Thorax triangular, filiform; eyes oblong, projecting, fpinous; the head is of a pale colour; the eyes are large, pointed, and conic; the thorax fmooth teftaceous, the angles more dufky; wing-cafes fhorter than the wings, white diaphanous, ftriate, and obtufe; legs long, dufky, and unarmed.

Superstitiosa. Thorax linear, triangular, flightly ferrate on the fore-part; wing-cafes greenifh; the rib of the wings is tranfverfely ftriate. It is a large infect, and is found in Africa. The thorax is rough on the fore-part, fmooth behind; the wings are whitifh, having a rib with tranfverfe raifed brown lines.

Undata. Thorax carinate, grey; wings white, with black waves. It inhabits Tranquebar. The antennæ are filiform and pale; the thorax is filiform, triangular, and rough; wings fhorter than the abdomen; thighs lobate at the tip, fhanks at the bafe; the abdomen is long and filiform.

Irrorata Thorax is fmooth fubcarinate; wing-cafes green,

green, with fcattered ferruginous dots; the wing-cafes are fhorter than the wings. It is found in America.

Striata. Thorax carinate, and flightly ferrate at the fides; wing-cafes obfcure, hyaline, ftriate with brown, and fhorter than the wings; the head is grey; the antennæ are fimple; and the body is brown.

Oratoria, or Camel-cricket, is the chief of the European Mantis genus. It is found in moft of the warmer parts of Europe, and is entirely of a beautiful green colour. It is nearly three inches in length, and in its fitting pofture is obferved to hold up the two fore-legs, flightly bent, as if in the attitude of prayer: hence the common people have conferred upon it the reputation of a facred animal; and a popular notion has often prevailed, that a child or traveller, having loft his way, would be fafely directed by obferving the quarter to which the animal pointed, when taken into the hand. It is, however, in its real nature, a very rapacious animal, devouring all fmaller infects that fall in its way, for which it lies in wait with anxious affiduity. It is alfo of a very quarrelfome nature; and when kept with others of its own fpecies, in a ftate of captivity, will attack its neighbour with the utmoft violence, till one or the other is deftroyed in the conteft. Among the Chinefe, this quarrelfome property in the genus Mantis is turned into a fimilar entertainment with that afforded by fighting cocks and quails to Europeans. To infects of this kind Mr. Barrow is fuppofed to allude in his "Travels in China." He fays, "They (the Chinefe) have even extended their inquiries, after fighting animals, into the infect tribe, and have difcovered a fpecies of gryllus that will attack each other with fuch ferocity, as feldom to quit their hold without bringing away, at the fame time, a limb of their antagonift. Thefe little creatures are fed and kept apart in bamboo cages; and the cuftom of making them devour each other is fo common, that, during the fummer months, fcarcely a boy is to be feen without his cage of grafshoppers." The M. *religiofa*, with the thorax fubcarinate, is a mere variety of this fpecies.

Precaria. Thorax ciliate with fmall fpines; wing-cafes green, with a divided white and brown fpot. An inhabitant of Africa. The head and thorax are of a yellowifh-green; eyes ferruginous; fore-legs with a ferruginous fpot; wing-cafes longer than the body; wings hyaline, fpotted with green. This is the fuppofed idol of the Hottentots, which thofe fuperftitious people are reported to hold in the higheft veneration; the perfon on whom the adored infect happens to light, being confidered as favoured by the diftinction of a celeftial vifitant, and regarded ever after in the light of a faint.

Sancta. Thorax flightly ferrate, yellowifh-green; wing-cafes green, immaculate; wings hyaline. It is found chiefly in the fouth of France. The wings are greenifh at the tip; fore-fhanks with two black fpots beneath.

Simulacrum. Thorax ciliate; wing-cafes green, with a white fpot in the middle. It very much refembles the M. precaria, but the thorax is fhorter, thicker, and more ciliate. It inhabits America.

Monacha. Thorax fmooth teftaceous; wing-cafes and wings green hyaline; the fore-fhanks have two teftaceous dots on the fore-fide. It is found at the Cape of Good Hope.

Obscura. Thorax flightly ferrate, dull grey; wing-cafes with a black fpot at the bafe; the wings alfo have one at the tip. It inhabits Africa. The head is grey, with a black frontal fpot; thorax dufky, with a black dorfal line; fore-legs flightly ferrate; the other parts fimple.

Hyaliana. Thorax ciliate; wing-cafes hyaline, edged with green; front is two-toothed. It is found in America. With refpect to colour, the head is brown; antennæ ferrate; wings hyaline, ftriate with brown at the tip.

Fenestrata. Thorax fmooth; wings hyaline; exterior margin of the wing-cafes brown. It inhabits Africa. The thorax is linear; exterior margin of the wings is brown at the tip; legs pale; fore-fhanks with a few black fpots within.

Bidens. Thorax is rough; wing-cafes green, with black bars; wings brown-black on the difk. It inhabits America. The head is brown; front with two fharp approximate teeth; thorax linear, grey, with a few black raifed dots; wing-cafes with two oblique brown bands; legs brown; thighs pale at the bafe, and tipt with black; fhanks of the fecond pair lobate.

Grisea. Thorax fmooth; wing-cafes and wings grey, hyaline, fpotted with brown. A fpecimen in the Britifh Mufæum is middle-fized. Thighs of the fore-legs a little dilated at the upper margin; fpinous on the lower; the other legs varied with grey and brown.

Ministralis. Thorax rough, crenate, as long as the head, ferruginous on the fore-part; wing-cafes green; the head is yellowifh; antennæ brown; thorax carinate; outer margin of the wing-cafes fubferruginous; fore-thighs fulvous; abdomen brown, pale at the tip. Found in New Holland.

Urbana. Thorax entire; wing-cafes green, with a ferruginous dot and band. It inhabits India.

Rustica. Thorax fmooth, brown; wing-cafes fhorter than the wings, brown hyaline; antennæ hairy. It inhabits the fhores of Patagonia; the head is grey-brown, with globular raifed ftemmata; the legs are yellowifh.

Nasuta. Thorax fpinous and ciliate; front projecting, fpinous, emarginate. It inhabits the Cape of Good Hope. Head flat; front two toothed on each fide, and widely emarginate at the tip; thorax black with a raifed tubercle before and behind; wings and wing-cafes grey hyaline, with numerous brown dots at the nerves; the legs are black and annulate.

Lobata. Thorax three-lobed; front with a bifid horn; eyes conic, pointed. This alfo is found at the Cape, and is particularly defcribed by Thunberg; the mouth is varied with green and brown; the front is greenifh, with a projecting bifid horn between the antennæ; wing-cafes green, with a white bafe and fpot in the middle; wings black, tipt with white; body varied with green and white; margin of the abdomen elevated and lobate.

Pulchra. Thorax green throughout; the wings are brown hyaline, ferruginous at the bafe. It inhabits Tranquebar. The antennæ are brown; head and thorax green, a little yellowifh at the edge; wing-cafes green, the margin yellow at the bafe; abdomen above brown, beneath green; legs yellow.

Fausta. Linear, afh-coloured, fpotted with black. This is an inhabitant of the Cape, and has been defcribed by Thunberg: it is the tutelar deity of the Hottentots.

Perspicua. Dufky; wings and wing-cafes hyaline; but the wings have a brown marginal fpot and tip. It is a fmall infect, and is found at Cayenne; the wing-cafes have a fmall black dot towards the bafe.

Pagana. Wings reticulate, white with a lateral ferruginous fpot; ends of the legs chelate. It inhabits France and Germany. The thorax is cylindrical, and entirely brown.

Minuta. In this the thorax is cylindrical and yellowifh; wing-cafes hyaline, with a greenifh rib. It inhabits South America. The wing-cafes have a fmall white dot in the middle;

middle; the abdomen is greeniſh, and yellowiſh on the back; the legs of a greeniſh colour.

Pusilla. Thorax cylindrical, yellowiſh; wing-caſes and wings hyaline, immaculate. It inhabits Africa.

Carolina. Thorax ſubciliate, carinate; wing-caſes whitiſh, waved with brown. It inhabits Carolina; wings and their caſes ſhorter than the body.

Labiata. This is an inhabitant of India: it is linear, greeniſh, unarmed; ſides of the head green.

Maculata. Cinereous; thorax winged, ſubſpinous; legs ſpotted within with black. This is found in the iſlands of Japan.

Capensis. This alſo is cinereous; the thorax is unarmed; the head is conic entirely. It inhabits Africa and India.

Parva. Livid and ſmooth; wing-caſes and wings hyaline; ſegments of the abdomen edged with black. It inhabits America.

Cingulata. Thorax browniſh; wing-caſes green, reticulate with black, and marked with four blackiſh ſpots; wings blackiſh, with black lines, the edge yellowiſh-brown. It inhabits Jamaica. Abdomen annulate with black; it is two-ſpined at the tip.

Gigantea. Browniſh; neck, thorax, and thighs ſerrate. It inhabits Italy.

Angusta. This is of a greeniſh colour; the tail is forked; the antennæ are filiform, and as long as the body. It inhabits Antigua.

Sibirica. This is ſuppoſed to be a variety of the M. puſilla, and is an inhabitant of Siberia: the body is varied with yellow and brown; wings hyaline with reddiſh nerves.

Brachyptera. Cinereous; thorax toothed; wings half as long as the body. Is found alſo in the deſerts of Siberia.

Pennicornis. The crown of this inſect has a conic ſpine; the antennæ are feathered and linear; the hind thighs terminate in a lobe. It is found in the deſerts bordering on the Caſpian ſea, and very much reſembles in ſhape and colour the M. gongylodes.

MANTLE, or Mantle-*tree*, in *Architecture*, is the lower part of the breaſt or front of a chimney. It was formerly a piece of timber that lay acroſs the jambs, and ſupported the breaſt-work; but by a late act of parliament, chimney-breaſts are not to be ſupported by a wooden mantle-tree, or turning-piece, but by an iron bar, or by a brick or ſtone arch. See Chimney.

Mantle, *Mantling*, or *Lambrequin*, in *Heraldry*, that appearance of folding of cloth, flouriſhing, or drapery, that is in any achievement drawn about the coat of arms. This, properly ſpeaking, is an ornament that was anciently fixed to the helmet, like that now worn round the caps of our light dragoons.

It is ſuppoſed originally to have been the repreſentation of a mantle, or military habit, worn by ancient cavaliers over their armour, to preſerve it from ruſt; or, as others hold, a ſhort covering only worn over the helmet to defend the head from the weather, which, in after-times, was lengthened, and made to hang from the helmet below the whole ſhield. Sometimes it hung in a looſe, flowing, ragged manner; ſometimes it is repreſented as cut or entire, and hanging back over the neck of a warrior, in which caſe it is called a "Cappeline." The forms of theſe ancient mantlings, and the manner in which they uſually waved from the helmet of a warrior, are beſt repreſented on ancient ſeals. In length of time, the uſe and locality of theſe mantlings ſeem to have been forgotten; for we find the heralds, through an unaccountable inadvertency, forming them like cloaks to receive or cover the whole achievement, inſtead of purſuing their ancient mode of repreſenting them, as being coverings for the head, or ornaments flowing from the helmet of the warrior, and of the colour of his arms. According to ſuch modernized manner of bearing mantlings, thoſe of the ſovereigns are ſuppoſed to be of gold doubled with ermine; thoſe of the peers, crimſon velvet, folded, and ermine inſide; and thoſe for knights and gentlemen, crimſon velvet doubled with white ſatin. The prevalency of this mode becoming ſo general, that all ſorts of perſons painted mantles of crimſon and ermine on their carriages, Mr. Edmondſon, in the year 1760, propoſed to ſeveral of the peers to paint (on their carriages) their arms, placed in mantles of crimſon, with their edges thrown back ſo as to ſhew their doublings, or linings, which ſhould be of ermine, and containing a number of rows of ermine ſpots, equal to thoſe of the guards on their coronation robes, expreſſing their reſpective degrees, *viz.* a baron two rows, a viſcount two and a half, an earl three, a marquis three and a half, a duke four, &c. This propoſal having met with general approbation, was carried into execution, and had the deſired effect of ſhewing the diſtinction between the ſeveral ranks and degrees of our nobility. After which Edmondſon formed mantles for the knights companions of the ſeveral orders, taken from the mantle and robes which they wear at their inſtallation.

The mantle is always ſaid in blazon to be doubled, that is, lined throughout with one of the furs, as ermine, pean, vairy, &c. See Coat.

Mantle *of the Knights of the Garter*. See Garter.

Mantle is likewiſe a term uſed in *Falconry*. They ſay the hawk mantles, that is, ſpreads her wings after her legs.

Mantle, *Lady's*, in *Botany*. See Alchemilla.

MANTO, or Olancho el Viejo, a town of Mexico, in the province of Honduras. N. lat. 14° 4'. W. long. 86°.

MANTON, Thomas, in *Biography*, a learned Engliſh divine, was born in the year 1620. He was educated in grammar-learning at Tiverton-ſchool, and when he was about fifteen years of age was entered at Wadham-college, Oxford. Here he took his degrees, and was ordained deacon by the biſhop of Exeter at the age of twenty. He was firſt ſettled at Columpton in Devonſhire, and afterwards at Stoke Newington, in the vicinity of London, where he was highly eſteemed as a preacher and expoſitor of the holy ſcriptures. From Newington he went to St. Paul's Covent Garden, having been preſented to that living by his grace the duke of Bedford. In 1653, he was appointed one of the chaplains of the protector Oliver Cromwell: but in 1660 he took an active part with the Preſbyterian miniſters in general, in bringing about the reſtoration of king Charles II., for which ſervice he was nominated one of the chaplains to his majeſty, and, in conſequence of the king's mandamus, created doctor of divinity. He refuſed to ſubmit to the act of Uniformity, and under the operation of that act he was, in 1662, ejected from his living, after which he held a private meeting in his own houſe, but was perſecuted and impriſoned for exerciſing the miniſterial functions. He was highly eſteemed by perſons of great conſequence in the ſtate, and was conſulted by them with reſpect to all the treaties for the comprehenſion with the eſtabliſhed church. He had great weight among his own brethren, on account of his zeal and activity in their affairs. He died in the year 1677. He was eſteemed a man of great learning as a theologian, and was deeply read in ancient and modern hiſtory. He is characterized by doctor Bates as a divine of rich fancy, a ſtrong memory, and happy elocution, improved by diligent ſtudy.

ftudy. His fermons make five large folio volumes, one of which contains 190 on the 119th Pfalm. The talk of reading thefe fermons to his aunt, when he was but a child, produced a very unhappy effect on the mind of lord Bolingbroke. In a letter to Swift, he writes, "my next fhall be as long as one of doctor Manton's fermons, who taught my youth to yawn, and prepared me to be a high churchman, that I might never hear him read, nor read him more."

MANTRA, in *Hindoo Mythology*. The Afiatics, generally fpeaking, have great faith in charms, talifmans, and fimilar items impofed by craft on ignorance and fuperftition. Among the Hindoos this feeling is very prevalent. They have mantras, and tantras, and yantras; and as many books in the Sanfkrit language are extant on thefe fubjects, their differences and diftinctions are doubtlefs well known to the Brahmans; although, hitherto, thofe books do not appear to have been fufficiently examined (and it may be well queftioned, if they are worth the labour), to be underftood by any of our oriental fcholars. As far as hath been made known, a mantra generally means a curfe, a fort of imprecatory incantation, either ejaculated or written, and compofed of a paffage from one of the Vedas, containing the name of fome tremendous deity. Sometimes it appears rather to affume the form of what we underftand of the word talifman; affecting fupernatural purpofes, fuch as rendering a perfon invifible, &c. Both Hindoos and Mahommedans have great faith in the efficacy of propitiatory incantations, more efpecially the former, and a correfponding dread of thofe of a malevolent tendency. It is, of courfe, the triumph of priefteraft to keep alive thefe impreffions, and the facred and other books of the Hindoos are well calculated for that effect. The malediction of a prieft would ferioufly affect the comfort and quiet of a pious Hindoo. The following paffage from the *Ramayana*, a much efteemed epic poem, as is noticed under that article, will ferve to exemplify this, as well as the accredited femi-omnipotency of the Brahmans: and, with thofe who have faith in thefe doctrines, affords a fufficient reafon to fear the effects of fuch curfes. "Even he who cannot be flain by the ponderous arms of Indra, nor by thofe of Kali, nor by the terrible chakra of Vifhnu, fhall be deftroyed if a Brahman curfe him, as if he were confumed by fire." If the reader be defirous of farther information on the above paffage, he will find, under the article Indra, mention of his "ponderous arms," the vajra; and of the "terrible chakra" under Vishnu. See alfo Kali. A tantra is a fort of hieroglyphic myfterioufly facred to a particular deity. Of thefe tantras there are a great many, as we are informed by Mr. Paterfon, in his "Effay on the Origin of the Hindoo Religion," in the eighth volume of the Afiatic Refearches. (See alfo the Hindoo Pantheon, under Tantra in the Index.) The term, as well as Yantra, is applied to invocations of a fupplicatory tendency, or to defenfive incantations; likewife to a philtre, or charm; and to other fooleries fimilar to our abracadabra and magic fquares. Thefe things are, however, not found in the Vedas, nor even in the Puranas, of the Hindoos, but are taught in great detail by the Agama Saftra, a compilation of much later date; fabricated, as hath been reafonably fuppofed, by perfons, who in thefe, as in other matters, eftablifhed many unjuftifiable practices on the foundations of emblems and allegories, which they mifunderftood.

MANTSALA, in *Geography*, a town of Sweden, in the province of Tavaftland; 37 miles S.E. of Tavafthus.

MANTUA, in *Ancient Geography*, a town of Italy, S.E. of Brixia, and S. of the lake Benacus on the Mincius. Although this town is celebrated for its antiquity, its origin being traced to the Tufci, 600 years B. C., it is ftill more diftinguifhed as the place near which Virgil was born. The town was encompaffed by a lake, which was formed by the waters of the river.

Mantua, in *Geography*, was, previoufly to the arrangements fubfequent to the French revolution, a duchy of Italy, bounded on the N. by the Breffan and Veronefe, on the E. by the Ferrarefe, on the S. by the duchy of Modena, and on the W. by the Cremonefe. In length it is about 50 miles, and in breadth 35. It is watered by the Po, which runs through the middle of it, and alfo by the Oglio, Mincio, Secchia, &c. which difcharge themfelves into the Po. This territory abounds with corn, fruits, and legumes, and it affords fome wine, great quantities of flax, and many good horfes. The fmall duchy of Mantua was taken poffeffion of by Lewis of Gonzaga in the year 1328, and was held by the houfe of Gonzaga from this period; till at length the laft of the family was put under the ban of the empire. In 1703, the emperor transferred to the duke of Savoy that part of the duchy of Montferrat, which had been poffeffed by the dukes of Mantua as a fief. In 1707, the Imperialifts over-run the whole duchy, and duke Charles IV. died in the following year under the ban of the empire. From this time the houfe of Auftria continued in poffeffion of the duchy, annexed to the government of the Milanefe, till by the peace of Luneville it was ceded to the Cifalpine republic, now the kingdom of Italy; and it forms the department of the *Mincio*; which fee.

Mantua, the capital of the late duchy and of the prefent department of the Mincio, fituated on a lake formed by the inundations of the river Mincio; about 20 miles in circumference, and two broad. The two chief bridges leading to this city over the lake are Ponte di Molini, defended by two citadels, and Ponte di St. Giorgio, with fortifications at both ends. The water divides the city into two parts nearly equal, which communicate with each other by fix bridges. In fummer, when the water ftagnates, the infalubrity of the air conftrains the higher clafs of inhabitants to leave the city. The ftreets are, in general, long, broad, and ftraight, with handfome ftone houfes, fine fquares, and ftately churches. On the other fide of the lake are three fuburbs. Mantua comprehends four collegiate churches, 21 parochial, 14 other churches and alms-houfes, 11 oratories, 40 convents; and without the city are three parifh-churches, two other churches, and feven convents. The Jews, of whom there are about 4 or 5000, live in a diftinct quarter. The population, exclufive of the garrifon, was formerly eftimated at 50,000; but it has fince been reduced, fo that at prefent it does not amount to more, as fome fay, than 16,000, or, according to others, 12,000. The pofition and fortifications render it a place of great ftrength. In the cathedral, which is a work of Julio Romano, are paintings of the moft celebrated mafters. The church of Antonio is more famous for relics than any other in the city. The Francifcan church has an elegant infide and a good library. The edifice formerly occupied as the ducal palace is fpacious and roomy; but the ducal gallery and mufeum were pillaged in 1630 by the Imperialifts, fo that it is now empty and in ruins. The palace church, however, has fome valuable relics and other rich furniture, befides two pictures of ineftimable value, *viz.* one of the Baptifm of Conftantine the Great, and the other of the Martyrdom of St. Antonio. The univerfity was founded in 1625. The filk and other manufactures are now inconfiderable. This city, after enduring a long fiege, was taken by the French in February, 1797; 70 miles S.S.W. of Venice. N. lat. 45° 8′. E. long. 10° 44′.

Mantua *Carpetanorum*, in *Ancient Geography*, the ancient name,

name, as some suppose, of Madrid; but others think that it was situated near it, and that the present name is Villamanta.

MANTUANO, in *Biography*. See VENUSTI MARCELLO.

MANTUANUS, the poetical name of *Battista Spagnuolo*, was born at Mantua in 1448; he entered into the order of the Carmelites, and pursued his studies in various cities, and under different masters. He was particularly attached to Latin poetry, but without neglecting his graver studies. He bore several important offices, undertook many journies, and was finally made general of his order in 1513. He died in 1516, and a marble statue, crowned with laurel, was erected to his memory. The fame of Mantuanus once stood so high that some writers placed him in parallel with Virgil: others carried the matter still farther, and thought the Pagan ought not to be mentioned in comparison with the Christian poet. He is said to have written 55,000 verses. Erasmus thought highly of his talents, but Scaliger ranked him with mere versifiers. His "Poetical Works" were published at Bologna, in folio, in 1502; and at Antwerp they were re-published in 1576, in 4 vols. 8vo.

MANUAH, in *Geography*, a town of Hindoostan, in Guzerat, in the gulf of Cambay; 10 miles S. of Goge.

MANUAL, MANUALIS, signifies what is employed, or used by the hand, and whereof a present profit may be made.

Thus, such a thing is said to be in the manual occupation of one, where it is actually used or employed by him.

MANUAL is the name of a service-book used in the church of Rome, containing the rites, directions to the priests, and prayers used in the administration of baptism and other sacraments; the form of blessing holy water, and the whole service used in processions.

MANUAL *Exercise*, in *Military Language*, is the exercise of the musket, independently of powder and ball. About the year 1757, a new manual exercise was introduced into the British army, very much resembling the modern improved system of Frederic, the father of the great king of Prussia; who was the first that caused the manual exercise to be contracted, and the motions performed close to the body. This exercise has of late been simplified and reduced to a smaller number of motions. The following are the seven movements of the present manual exercise: 1. Order arms; three motions. 2. Fix bayonets; one motion. 3. Shoulder arms; one motion. 4. Present arms; three motions. 5. Shoulder arms; two motions. 6. Charge bayonets; two motions. 7. Shoulder arms; two motions. See BATTALION.

About the same time the evolutions, manœuvres, or field movements, which were various in different corps, and very numerous in some, were reduced to one standard, and confined in number to 18. The purposes of these changes were stated in the "Regulations" to be, the reconciliation of celerity with order; to prevent hurry; to insure precision and correctness; to inculcate and enforce the necessity of military dependence, and of mutual support in action; to adopt such motions only as are necessary for combined exertions in corps, rejecting only what is curious on parade; and to make utility, not show, the principal object. See BATTALION, *Formation and Order of the* BATTALION.

MANUBALISTA, the ancient name of the *cross-bow*; which see.

MANUBIÆ, among the *Romans*, the spoils of the enemy, or rather the money made of the booty when sold by the quæstor.

MANUCAPTIO, in *Law*, a writ which lies for a man, who being taken on suspicion of felony, and offering sufficient bail for his appearance, is refused to be admitted thereto by the sheriff, or other having power to let to mainprise.

MANUCMANUC, in *Natural History*, a name given by the people of the Philippine islands to a very beautiful species of parrot, which is found very frequently wild in the woods there. It is of the same bigness with the common parrot, and is variegated with a great many different colours.

MANUCODE, in *Ornithology*. See PARADISEA *Regia*.

MANUCODIATA. See PARADISEA *Apoda*, MEROPS *Flavicans*, and MUSCICAPA *Paradisi*.

MANUCODITOTA. See TODUS *Paradiseus*.

MANUDUCTOR, a name given to an ancient officer of the church; who from the middle of the choir, where he was placed, gave the signal for the choiristers to sing, and marked the measure, beat time, and regulated the music. The Greeks called him *mesochoros*, because seated in the middle of the choir; but, in the Latin church, he was called *manuductor*; from *manus*, and *duco, I lead*; because he led and guided the choir by the motions and gesture of the hand.

MANUEL, COMNENUS, in *Biography*, emperor of Constantinople, was appointed successor to his father, John Comnenus, at his death in 1139, to the prejudice of an elder brother. The soldiery approved of the nomination on account of his military talents and heroism. He is said to have equalled the most renowned champions of chivalry with regard to warlike prowess, but at the same time no one surpassed him in luxury and dissolute indulgence during the intervals of peace. Soon after his accession he marched into Asia with a powerful army, and having recovered several towns in Phrygia, which had been taken by the Turks, he laid siege to their capital Iconium. He was unable to reduce this important place; and after securing the frontiers by garrisons he returned to Constantinople. During his stay in the capital, he married Germana, or Irene, sister-in-law to the German emperor Conrad, but this connection did not prevent him from engaging in a criminal commerce with his own niece Theodora. In the crusade of 1146, led by Conrad, Manuel, jealous of the passage of a number of ferocious bands through his territories, is charged with having used means for their destruction, and it has been affirmed by the Latin historians, that he privately acquainted the Turkish sultan with the designs of the crusaders. Roger, king of Sicily, having made himself master of the isle of Corfu, which was considered as part of the Constantinopolitan empire, and having also plundered Corinth, Thebes, and other towns of Greece, insulted Constantinople itself. Manuel, therefore, assembled a great fleet, with which he recovered Corfu, after which he carried war into the dominions of his enemy, and reduced the greatest part of the provinces of Apulia and Calabria, by means of his lieutenant Michael Palæologus. His success was so great and important, that he even entertained hopes of acquiring Italy and the western empire: with this view he attached to his cause several nobles in Rome itself, and married his niece to one of the family of Frangipani. His expectations were, however, defeated through the jealousies which subsisted between the Roman and Greek churches, and he was obliged to make a treaty and renounce his conquests, retaining only the shadow of a nominal sovereignty. Manuel had been engaged, in perfon, againft the Servians, whom he repulfed with great lofs, and feveral of whofe towns he took and deftroyed. In a progrefs afterwards through his Afiatic dominions, he was fumptuoufly entertained by the princes of the Weft; but an infult which he received from the Turks on his return, induced him to tranfport a powerful army into Afia, with which he ftruck fuch terror into the fultan, that he fued for peace, which was immediately concluded. When Manuel had overcome his foreign and political enemies, he engaged in religious contefts, and difturbed the church by endeavours to introduce heterodox opinions. Finding his life drawing to a conclufion he put on the monaftic habit, determining to retire from the world. He died in 1177, after a very bufy reign of thirty-eight years. He left a fon, Alexius, who fucceeded him. Univer. Hift. Gibbon.

Manuel Palæologus, emperor of Conftantinople, born in 1349, was fecond fon of John Palæologus. His father was not only reduced to a fervile dependence on the Turkifh fultan, but meanly fubmitted, at his orders, to deprive his eldeft fon Andronicus of his fight; he, therefore, affociated Manuel to his fceptre, which now ruled over little more than the metropolis and its immediate diftrict. On the death of John in 1391, Manuel was ferving by compulfion in the army of Bajazet, but upon receiving intelligence he efcaped, and arriving at Conftantinople, mounted the throne. Bajazet immediately invefted the city, and compelled the new fovereign to purchafe a peace on very ignominious conditions, and after carrying on the conteft a fhort time, he refigned the royal power to his nephew, and embarked for Venice. From Venice he made a progrefs through the principal courts of the Weft, to engage the fovereigns to contribute their aid for the defence of the bulwark of Chriftendom againft the Mahometan arms. He vifited Italy, France, England, and Germany, and was every where received with a refpect and commiferation due to his great misfortunes, but he was unable to roufe the princes to any effectual efforts. After an abfence of two whole years he returned, in 1402, to the Morea, where he heard of the defeat and capture of Bajazet by Tamerlane, and of the temporary relief of Conftantinople. He was now reftored to his throne, and his competitor banifhed to Lefbos. He foon after recovered feveral of his provinces, which he enjoyed till his death in 1425, at the age of feventy-fix. Univer. Hift. Gibbon.

Manuel, Don Juan, grandfon of king St. Fernando of Caftile, is frequently referred to in Spanifh hiftory during the reigns of Ferdinand IV. and Alonzo XI. with whom he was fometimes at open war; but having at length effected the marriage of his daughter Coftanza with the infante D. Pedro, then heir of Portugal, peace was eftablifhed between them. He was prefent at the great battle of Salado, in October 1340, after which, the victory being fo complete and tremendous, Spain was never more endangered by the African Moors. He died in 1347. Don Juan Manuel holds a ftill higher rank in the literary than in the political hiftory of his country: his writings are among the earlieft fpecimens of Caftilian profe; they are twelve in number, of which the titles are given in the General Biography, but only one of them, *viz.* "El Conde Lucanor," has yet been publifhed. This was firft printed by Argote de Molina, in 1575, and it was re-printed in 1642. It is a dialogue between the Conde Lucanor and his friend Patronio, in which the latter offers his friend fome good advice, and illuftrates all his precepts by examples. Gen. Biog.

MANUFACTORY, from *manu-factus*, q. d. *made with hands*, a place where feveral artifts and workmen are employed in the fame kind of work, or make a commodity of the fame kind.

MANUFACTURE is popularly ufed to fignify the work itfelf; and by extenfion, the like work carried on independently in different parts of the country.

In this fenfe we fay, the *cotton* manufacture, *woollen* manufacture, *filk* manufacture, *velvet* manufacture, *tapeftry* manufacture, *muflin* manufacture, &c. manufacture of hats, ftockings, &c.

By 23 Geo. II. c. 13. if any perfon exports any tools or utenfils ufed in the filk, linen, cotton, or woollen manufactures, he forfeits the fame, and 200*l.*; and the captain of the fhip, having knowledge thereof, 100*l.* And if any captain of a king's fhip, or officer of the cuftoms, knowingly fuffers fuch exportation, he forfeits 100*l.* and his employment, and is for ever made incapable of bearing any public office. And every perfon collecting fuch tools for exportation, fhall on conviction forfeit them, and 200*l.* (See alfo 14 Geo. III. c. 71.) By 21 Geo. III. c. 37. the above penalties on the captain of the fhip and officer of the cuftoms are augmented to 200*l.*; and a perfon having in his cuftody, or procuring to be made any fuch tool, fhall forfeit the fame, and 200*l.*, and be imprifoned for twelve months. Profecution on this claufe to be within twelve months after the offence committed. By 22 Geo. III. c. 60. any perfon exporting any fuch tools, fhall forfeit the fame, and 500*l.*; and any officer of a fhip, conniving at it, fhall forfeit 500*l.*, and if it be a king's fhip, forfeit alfo his office, and be incapacitated.

Much was done under the aufpices of the magnanimous prince Edward III., for eftablifhing our domeftic manufactures, by prohibiting the exportation of Englifh wool, and the importation or wear of foreign cloths or furs, and by encouraging cloth-workers from other countries to fettle here.

Manufacture, *Cotton*, one of the leading and moft important branches of our national induftry and commerce.

The hiftory of its aftonifhing progrefs in the laft century, the fucceffive improvements in the machinery, which have been made by various inventors, and the extent of the trade, with other curious important facts, are detailed under the article Cotton: it is needlefs, therefore, to recapitulate thefe circumftances, and we fhall proceed at once to defcribe this extenfive manufacture, as conducted on the moft improved fyftem in fome of our largeft cotton-mills. Many of our readers may have viewed a cotton-mill with wonder, but not with intelligence, nor with leifure to trace the fteps by which the wool from the bag ultimately affumes the form of a very fine thread. Bewildered by fuch a complication of machinery all in motion, very few, we imagine, are able to recollect, with diftinctnefs and intelligence, the effential part of the proceffes by which the form of the cotton is fo wonderfully changed. Such readers will not think a page or two mifemployed, in giving a brief account of the different operations the cotton paffes through, from the raw cotton or cotton wool, as imported, to the finifhed thread; and we fhall afterwards enlarge upon each fubject, and defcribe the machinery by which thefe operations are effected in the moft expeditious and perfect manner. For the explanation of thefe, we have appropriated 13 of our plates, which are entitled *Cotton Manufacture.*

Cotton, it is well known, is the produce of a fhrub in the warmer climates of the Eaft and Weft Indies, and even in the more temperate countries which border on the Levant. It comes to us packed in bags, without any further preparation

preparation than being pretty carefully picked out of the pod in which it grows; but ftill much dirt, hufk, and other impurities remain in it. The cotton wool is imported either in bags or in bales: the bags weigh from $1\frac{1}{2}$ cwt. to 5 cwt., and the bales ufually weigh $3\frac{1}{4}$ or $3\frac{1}{2}$ cwt. On arriving at the cotton-mill thefe are unpacked, and the contents examined at the fame time it is turned over and beaten with a ftick, and the grofs impurities picked out with the fingers. This is called *forting*, and the object of the beating is to foften and open the fibre of the cotton, fo as to expofe every part. The forting is performed immediately when the bags of cotton are opened, but it has ftill to undergo a fecond examination, called *picking;* the principal object of the firft examination, or forting, being intended to afcertain the quality of the cotton, and to find what kind of goods it is beft adapted for manufacturing, and in this examination the coarfeft impurities and yellow damaged parts are picked out.

After forting the cotton, it is carried to the *batting machine*, and the coarfer forts of cotton to the *opening machine*, which is known to the workmen by the name of *devil*. In the batting machine, the cotton is fpread upon a platform of ropes ftrained very tight, and a number of rods ftrike very fmartly upon it, by which they open the fibres and loofen the knots of cotton preparative to the fucceeding operations: at the fame time the violence of the batting loofens and fhakes out all dirt, duft, and cotton feeds, of which the cotton in its raw ftate contains a great number, and which would be very prejudicial to the operations of the more delicate machines. The cotton, when firft packed up in the bags, is compreffed very clofely, for the convenience of ftowage, and this condenfes it into a hard matted mafs; but the batting machine, ftriking it violently with fmall fticks, caufes the fibres, by their natural elafticity, and the motion occafioned among them, to gradnally loofen and difengage themfelves, and the cotton, by repeated ftrokes, recovers all its original volume.

The *opening machine* has the fame objects, and produces the fame effects, though in a very different manner, as it confifts of a rapidly revolving cylinder, on which a great number of iron teeth, or fpikes are fixed, which tear and open the cotton againft other fimilar teeth, which are fixed in a ftationary half cylinder or hood, enclofing the other. The batting machine is ufed for the finer kind of cotton; and the opening machine, which acts in a more rapid though lefs effective manner, is employed upon the coarfer forts. After batting or opening, the cotton is again picked, to remove thofe finer particles of dirt which were before enveloped in the cotton, but are expofed by the operation of the machine. It is performed by women, who remove all extraneous matter, and every particle of yellow or damaged cotton. The perfection of the article to be produced, depends in a great degree on the care with which the picking is performed, and this is almoft the only procefs, in the cotton fpinning, which cannot be performed by machinery, becaufe it neceffarily requires a difcretionary power.

The cotton wool being picked clean, is next *mixed*, that is, the contents of different bags are mixed together with a view of obtaining a fimilarity in the quality of the cotton which is to be fpun. In this operation the greateft art of cotton-fpinning confifts, and it is that department in which experience alone guides the manufacturer. By a judicious mixture of different forts of cotton, fome fpinners will produce a very fine and capital yarn, from fuch cotton as would, if fpun alone, or improperly mixed, only produce coarfe and low priced goods. The mixture is effected by making a pile or heap, confifting of fucceffive layers, of the different kinds of cotton which are to be mixed; then by raking away a fmall quantity at a time from the edges of the heap, ftriking the rake from the top to the bottom, through all the different layers, the cotton will be very equally mixed. Sometimes the cotton wool is dyed, and different colours are mixed together. It is now fpread out, very evenly and regularly, upon a long cloth, which is rolled up and carried to the

Carding machine.—This confifts of a number of cylinders, covered with wire teeth or cards, and revolving with confiderable velocity in oppofite directions, nearly in contact with each other, and covered by a dome alfo lined with cards. The cotton, being introduced among thefe, is continually combed, or carded, by the teeth, until almoft every individual fibre is feparated and drawn ftraight, and every little knotty and entangled part difengaged. By paffing gradually through the machine from one cylinder to another, the cotton is difperfed lightly and evenly among the teeth over the whole furface of the laft, or finifhing cylinder, from which it is detached by the mechanifm in a continued fleece. This is drawn off, and lapped upon a cylinder turned flowly round by the machine, until the fleece has made a great number of turns upon the cylinder: it is then broken off, by dividing it at one part, fo that it forms a fleece called a lap, which is the length of the circumference of the cylinder, and confifting of fifteen or twenty thickneffes, by which admirable contrivance very great regularity is obtained in the thicknefs of the lap, becaufe if any one part of the fleece produced by the machine is thinner or thicker than it ought to be, in confequence of any irregularity in the fpreading of the cotton-wool upon the cloth, previous to carding, fuch irregularity will have no fenfible effect upon the ultimate thicknefs of the lap, becaufe it is compofed of thirty or forty ftrata, and there is no probability that the inequalities of thefe feveral ftrata will fall beneath each other, but every chance that they will be equally difperfed through the whole, and thus correct each other. The lap, when taken off, is laid flat on a cloth, which, with it, is rolled up and conveyed to a fecond carding-machine, called the *finifhing card*, while the firft is called the *breaker*. In this fecond card it undergoes a fimilar procefs to the firft, but inftead of the fleece being received on a cylinder, it is contracted by paffing through a funnel, in which the fleece, being hemmed in on both fides, is gradually contracted to a thick roll, which may be continued to any length as long as the machine is fupplied with cotton. This roll or band of cotton is drawn off between two rollers, which comprefs it into a pretty firm, flat ribband, about two inches broad. The rollers deliver it into a tin can, placed to receive it, and in this it is removed to the

Drawing Frame.—This machine confifts of feveral pairs of rollers, between which the cotton is paffed, and every fucceffive pair it is drawn through moves, by means of the wheel-work, with a greater velocity than thofe preceding it, fo as to ftretch out the band or fliver of cotton, in the fame manner as it would be drawn out, if one part of the fliver were held between the finger and thumb of one hand, and another part, at an inch or two diftant, being held in the other hand. Then by drawing the two hands afunder to the extent of four inches, it is evident two inches in length of the cotton fliver would be extended or drawn out to four inches. In like manner, the firft pair of rollers through which the fliver paffes, are preffed together with a fufficient weight to hold the cotton firmly between them. The fecond pair of rollers are fituated at one or two inches diftant, and are made by the wheel-work to revolve more fwiftly than the firft. The difference of velocity, however, is but fmall, though the confequence is, that the fliver will be lengthened in the fame proportion;

proportion; for the fecond rollers take up the cotton much fafter than the firft pair will deliver it out: it muft, therefore, be either forcibly pulled through between the firft rollers, or it muft be ftretched a little, by the fibres flipping among each other, or it muft break. When the extenfion is fmall, the only effect of it is merely to begin to draw the fibres (which are at prefent lying in every poffible direction) into a ftraight and parallel pofition, which is moft favourable for the fubfequent extenfions. The drawing frame contains a third, and fome of them a fourth pair of rollers, by which the fliver undergoes a fecond or third draught; but the combined effect of all thefe drawings is generally to extend the fliver to four times the length it was when firft put to the machine. But as this would reduce the fliver to one-fourth of the fize, which is not intended in this ftage of the procefs, four ends or flivers are introduced between the rollers together, and being drawn into one, which is four times the length, it will of courfe be of the fame fize as any one of the four which is put in. This drawing procefs is repeated three or four times, and the alteration it makes in the cotton is to equalize the fize of the fliver, on the fame principle as before defcribed of the breaking card, *viz.* by repeatedly combining four together, and drawing them into one: it alfo difpofes the fibres longitudinally and in the moft perfect ftate of parallelifm. The operation of carding effects this in a certain degree; yet the fibres, though parallel, are not ftraight, but many of them doubled, as may eafily be fuppofed, from the teeth of the cards catching the fibres fometimes in the middle, which become hooked or faftened upon them.

Though the general arrangement of the fibres of a fliver from the finifhing card is longitudinal, yet they are doubled, bent, and interlaced in fuch a way, as to render the operation we are now fpeaking of abfolutely neceffary.

When the cardings have been paffed four or five times through the drawing frame, every fibre is ftretched out at full length, and difpofed in the moft even and regular direction, fo that each fibre will, when twifted into a thread, take its proper bearing, in confequence of every one being ftraightened and having the fame tenfion.

The fliver in this ftate prefents a moft beautiful appearance, being fo extremely regular in its fize, and all the fibres drawn fo ftraight, that it bears a fine gloffy or filky appearance. It is upon this fliver or ribband of cotton wool that the operation of fpinning begins. The general effect of the fpinning procefs is, to draw out this maffive fliver, and to twift it as it is drawn out: but this is not to be done by the fingers, pulling out as many fibres of the cotton at once as are neceffary for compofing a thread of the intended finenefs, and continuing this manipulation regularly acrofs the whole end of the ribband, and thus, as it were, nibbling the whole of it away. The fingers muft be directed for this purpofe by an attentive eye; but in performing this by machinery, the whole ribband muft be drawn out together and twifted as it is drawn. This requires great art and very delicate management: it cannot be done at once, that is, the cotton roll cannot be firft ftretched, or drawn out to the length that is ultimately produced, from the tenth of an inch of the fliver, and then twifted. There is not cohefion enough for this purpofe, it would only break off a bit of the fliver, and could make no further ufe of it; for the fibres of cotton are very little implicated among each other in the fliver, becaufe the operation of carding and drawing has laid them all parallel in the fliver; and though compreffed a little, by its contraction in the card from a fleece of twenty inches to a ribband of two, and afterwards compreffed between the rollers of the drawing frame, yet they cohere fo flightly, that a few fibres may be drawn out, without bringing many others along with them. For thefe reafons, the whole thicknefs and breadth of two or three inches are ftretched to a very minute quantity, and then a very flight degree of twift is given it, *viz.* about two or three turns in the inch, fo that it fhall now compofe an extremely foft and fpungy cylinder, which cannot be called a thread or cord, becaufe it has fcarcely any firmnefs, and is merely rounder or flenderer than before, being ftretched to about four times the former length. This is called *roving*, and the operation is performed in the

Roving Frame.—This machine is conftructed in a great variety of forms, but all of them have the fame object in view, *viz.* to draw out the fliver, fo as to reduce it from a large band to a coarfe and loofe thread: but as this extenfion would render it fo extremely tender, that it would fcarcely hang together in paffing through the fucceeding machines, the roving frame, immediately after having drawn and extended it to the intended fize by rollers, operating in the fame manner as the rollers of the drawing frame, gives it a very flight twift, as before mentioned, and this loofe thread, which is called the roving, is the firft rudiment of a thread. Although it is extremely tender, and will not carry a weight of two ounces, it is much more cohefive than before, becaufe the twift given to it makes all the longitudinal fibres bind each other together, and comprefs thofe which lie athwart; therefore it will require twice the force to pull out a fibre from among the reft, but ftill not near enough to break it. In drawing a fingle fibre others are drawn out along with it, and if we take hold of the whole affemblage in two places, about an inch or two afunder, we fhall find that we may draw it to near twice its length, without any rifk of its feparating in any intermediate part, or becoming much fmaller in one part than another. It feems to yield equally over all parts.

Our readers will now perceive, that thefe proceffes will enfure all that is wanted, and prepare a roving that is uniform, foft, and ftill very extenfible: in fhort, fit for undergoing the laft treatment of fpinning, by which it is made a fine and firm yarn.

It is evident that the roving produced by thefe operations muft be exceedingly uniform. The uniformity really produced exceeds all expectation; for even although there be fome fmall inequalities in the carded fleece, yet if thefe are not matted clots which the card could not equalize, but only confift of a little more thicknefs of cotton in fome places than in others, this inequality will firft be diminifhed by the lapping of the fleece in the breaking card; and when fuch a part of the fliver comes to the firft roller of the drawing frame, it will be rather more ftretched by the fecond than a thin part would be. That this may be done with greater certainty, the weights of the firft rollers are made very fmall, fo that the middle part of the fliver can be drawn through, while the outer parts remain faft held.

Such is the ftate of the roving as prepared by the roving frame. All the preceding proceffes are to be confidered as the preparations: and the operation of fpinning is not yet begun. Thefe preparations are the moft tedious, and require more attendance and hand-labour than any fubfequent part of the procefs. For the flivers from which the rovings are made are fo light and bulky, that a few yards only can be piled up in the cans fet to receive them from the carding and drawing: a perfon muft therefore attend and watch each roller of the drawing and roving frames, to join frefh flivers as they are expended. It is alfo the moft important department

ment in the manufacture; for as every inch will meet with precifely the fame drawing and fame twifting in the fubfequent parts of the procefs, therefore every inequality and fault of the fliver, indeed of the fleece as it quits the finifhing card, will continue through the whole manufacture, in a greater or leffer degree, being only diminifhed, not corrected, by the drawing, doubling, &c. The fpinning of cotton-yarn now divides itfelf into two branches. The firft performed by what were called jennies, when worked by the hand, but fince they are moved by the power of a mill, they are called mules; the manner of action refembles the ancient fpinning with diftaff and fpindle. The fecond method, called fpinning of *twift*, or *water-fpinning*, becaufe it was the firft fpinning performed by a water-wheel, is in imitation of the fpinning with the fly-wheel, or jack and flyer. The two methods differ in the fame manner, as the old wool or cotton-wheel differs from the fpinning with the flax-wheel. Mr. Arkwright's chief invention, the fubftitution of the machinery for the immediate work of the human finger, was at firft only applied to the manufacture of twift, or water-fpinning. We fhall, therefore, firft direct our attention to this.

The water-fpinning procefs is little more than a repetition of that gone through in making the firft flivers or rovings, which are formed on bobbins, either by the roving frame, or are afterwards bound on bobbins by the hand. Thefe bobbins are fet on the back part of the

Spinning-frame, in which the roving is drawn, and extended to any required degree of finenefs; and the proper twift being given to it, forms it to the required thread. The fpinning-frame is provided with fyftems of rollers, in the manner of the drawing-frame, through which the roving paffes, and is drawn out according to the fize of the thread which is required to be fpun, which varies from four to feventeen times; and it is then twifted more or lefs, as the thread is required to be hard or foft: therefore, the fpinning procefs fcarcely differs from the roving, except in the twift that is given it, after the laft ftretching, in its length. This is much greater than the roving, being intended to give the yarn hardnefs and firmnefs, fo that it will afterwards break rather than ftretch any more. The perfection of the ultimate thread or yarn depends, in a great meafure, on the extreme foftnefs of the roving; for it is this only which makes it fufceptible of an equable ftretching, all the fibres yielding and feparating alike: and this property will be greatly influenced by the quantity of twift given by the roving-frame. For thefe points no very diftinct rule can be given: it varies in different mills, and with different fpecies of cotton wool, as may be eafily imagined. The immediate mechanifm, or manipulation, muft be fkilfully accommodated to the nature of that friction which the fibres of cotton exert on each other, enabling one of them to pull others along with it. This is greatly aided by the contorted curled form of a cotton fibre, and a confiderable degree of elafticity which it poffeffes. In this refpect it greatly refembles woollen fibres, and differs exceedingly from thofe of flax; and it is for this reafon that it is fo extremely difficult to fpin flax in this way: its fibres become lank, and take any fhape by the flighteft compreffion, efpecially when damp in the flighteft degree. But befide this, the furface of a cotton fibre has a harfhnefs or roughnefs, which greatly augments their mutual friction. This probably is the reafon why it is fo unfit for tents, and other dreffings for wounds, and is refufed by the furgeons even in the meaneft hofpitals. But its harfhnefs and elafticity fit it admirably for the manufacture of yarn. Even the fhortnefs of the fibre is favourable; and the manufacture would be very difficult, if the fibre were thrice as long as it generally is. If it be juft fo long that, in the finifhed thread, a fibre will rather break than come out from among the reft, it is plain that no additional length can make the yarn any ftronger, with the fame degree of compreffion by twining. A long fibre will indeed give the fame firmnefs of adherence, with a fmaller compreffion by twining. This would be an advantage in any other yarn; but in cotton, the compreffion is already as flight as can be allowed: were it lefs, it would become woolly and rough by the fmalleft ufage; and it is already too much difpofed to teazle out. Now, fuppofe the fibres much longer, fome of them may chance to be ftretched along the fliver through their whole length. If the fliver is pulled in oppofite directions, by pinching it at each end of fuch long fibre, it is plain that it will not ftretch till this fibre be broken up, or drawn out; and that while it is in its extended ftate, it is acting on the other fibres in a very unequable manner, according to their pofitions, and renders the whole apt to feparate and draw more irregularly. This is one great obftacle to the fpinning of flax by fimilar machinery.

Mule-fpinning.—A great proportion of the cotton is fpun in the mule inftead of the water-frame. The preparation it undergoes for either method is the fame; at leaft the proceffes are fimilar, except that the quantities of draft, and fome other particulars, may be varied in the preparation of the cotton which is to be thus fpun in this machine, which is called a mule, either becaufe it is a kind of machine which might eafily be turned by a mule, or more probably becaufe it is a fort of mongrel, partaking of the nature of both drawing and fpinning, or uniting the action of both the roller and fpindle. It confifts of three fets of fluted brafs rollers, the flutes of which turn into each other. The firft fet goes fafter than the fecond, and the fecond fafter than the third; between which, when the fliver of carded cotton enters, it is a little lengthened out between the firft and fecond, and farther ftill between the fecond and third; after paffing which, it is flightly twifted by the rapid circular motion of the fpindle. This has the fame effect as the fpinning-frame; but the quantity of draft between the rollers, or extenfion of the fliver, is not, like the water-frame, to the full extent which the thread is intended to be. The remainder of the ftretching is performed in this manner: the fpindles of the mule, which give the twift to the thread, are fitted in a frame, fo that they can be moved backward and forward, in a ftraight line, to and from the rollers; a certain length of the roving being therefore given out by the rollers, the fpindles are removed backward to take it up as faft as it comes, and in this motion they twift it flightly: at the fame time, but after a certain quantity of the roving, a yard for inftance, has been given out by the rollers, their motion ceafes; but the fpindle continues to recede from them, another half yard for inftance, continuing to twift the thread all the while. By thefe means, it is evident that the thread will be ftretched from a yard to a yard and half in length: by this contrivance, the cotton will bear a greater degree of extenfion than any other, becaufe it is conftantly twifted at the fame time that it is extended in length.

The invention of mules forms quite an epoch in the hiftory of the cotton trade. A vaft improvement was made, about 35 years ago, by the introduction of the fpinning jennies, by which from twenty to forty fpindles were turned at a time. The fpindles were the fame as the mule, and had the fame motion; but this machine was not provided with rollers to draw out the cotton, previous to twifting, merely depending upon the ftretching, to give it the proper extenfion requifite to form the roving into a thread. But the combination of the jenny with fir Richard Arkwright's invention of drawing, by rollers, forms a method fuperior to both, at leaft

leaft for fine goods. The method of ftretching gives the means, as we have before mentioned, of very great extenfion; but if this be carried fo far as to draw out the coarfe loofe roving to a fine thread, there will be great danger of its drawing irregularly, that is, more in one place than another. In the original method by the jenny, the rovings were prepared by the hand-wheel: they were loofe, coarfe, untwifted threads, partaking fomewhat of the nature of cardings, though approaching in fome degree to fpun twift. They were obliged to be prepared by the hand-wheel, becaufe the cardings, which were prepared by hand-cards, were in detached pieces of a certain length, and regularly tapering towards each end: the joining of thefe together, in fuch a manner as to produce an equal and regular roving, required a care and attention which could not be effected by machinery.

The combination of fir R. Arkwright's fyftem of preparation with the jenny produced the mule, which, without the defects of its original, fpins in the moft expeditious and perfect manner. The advantage of this mode of preparing the threads over that of the jenny is, that the fibres of the cotton are all laid longitudinally, and nearly in as fmall number as is wanted, before they are begun to be much twifted; by which means, threads of any required finenefs are made much ftronger than they were from rovings, made upon the fpindle of the hand-wheel fpun in the jenny, which twifted them too much in the firft inftance; and in the fubfequent extenfion or ftretching, by the removal of the fpindle, for rendering them finer, many of the fibres were neceffarily broken. On one of thefe mules 240 threads are often fpun at once; and two of them may be managed by one woman, with a child to tie the threads which may occafionally break.

It is needlefs, as the jenny has become an obfolete machine in the cotton manufacture, to enter into any further details, particularly as the mechanifm fo nearly refembles the jenny ftill ufed in the WOOLLEN *manufacture*. See that article.

The reader moderately acquainted with mechanics, cannot but perceive that by each of the operations now defcribed, the cotton-wool is prepared, and drawn into a fine ftrong thread, by repeatedly drawing the fliver till its fibres become ftraight, then reducing it in the roving frame to a coarfe thread, and by a flight twift giving it fufficient ftrength to bear fuch an extenfion as will reduce it to the fize intended, and then it is immediately twifted into a hard thread. All thefe proceffes are only a fubftitute for a fingle pull of the finger and thumb of the fpinner, which fhe accommodates precifely to the peculiar condition of the lock of wool which fhe touches at the moment: fhe can follow this through all its irregularities, and, perhaps, no two fucceeding plucks are alike. But when we cannot give this momentary attention to every minute portion, we muft be careful to introduce the roving in a ftate of perfect uniformity, and then every inch being treated in the fame manner, the final refult will be equable, and the yarn will be uniform.

The thread being now finifhed, either by the water-frame or mule, it is carried to the

Reel, by which it is taken off the bobbins of the fpinning frame, or the cops of the mule, and formed into hanks. The hank is a meafure in cotton trade, compofed of feven *leys*, each of 120 yards in length. The reel or frame round which the thread is wound is one yard and a half in circumference, and at every 80 turns (or *bouts*) which it makes, the 80 turns of the thread are tied together to keep them feparate, and this meafures out 120 yards, which is called a ley: but the thread is not cut at the ley, it is continued to be wound on the reel, till feven fuch leys, or 840 yards, are reeled: it is then cut and called a hank, which is tied up.

The different fizes of cotton yarn, or thread, are denominated according to the number of thefe hanks which will weigh a pound. The hank of 840 yards in length is the meafure ufed in all Englifh cotton-mills, and thus affords a very accurate and convenient ftandard for the fize of the cotton. The number is afcertained by weighing each individual hank in a little *weighing inftrument*, which fhews by an index what number of fuch hanks will weigh a pound. Each hank being twifted up is fufpended on the hook of this inftrument, and the number being afcertained, the hank is put on a proper fhelf till they are all forted. Then by a table on purpofe it is feen how many hanks of any number will weigh 10lbs. and this number being counted out from any one fhelf, is packed up in the *bundling prefs*, and tied in papers, marked, and fent away for market Sometimes, the cotton intended for weaving is warped in the warping-mill before it is fent away from the mill: this faves the weaver an immenfe deal of trouble.

Some of the twift is wound on quills for the fhuttle; and others, again, are formed into hanks, fome of which are tightly bound round at certain intervals previous to their being dyed, in order to prevent the parts fo tied from taking the colour. This is done that the threads may be difpofed to warp in the weaving loom, fo as to produce the clouds which are feen in various fpecies of the cotton goods, efpecially ginghams.

Some of the cotton thread is dyed in the hank, and other cotton which is intended for fewing, knitting, &c. or to weave fine goods, is bleached; and becaufe in this procefs, or in dyeing, fome fhrinking takes place, it is wound from the hanks upon bobbins again by the *winding machine*, and from thefe bobbins it is again reeled into hanks, in which it is packed up and fent to market: other cotton thread for fewing, mending, and domeftic ufe, is wound into balls of a figure refembling a cafk, and the many interfections of the thread are fo managed as to produce a very beautiful appearance.

The denominations of the quality of the different kinds of cotton threads are chiefly divided into *yarn* and *twift*, and this is called *mule* twift, or *water* twift, as it is fpun either in the mule or water-frame. That thread which is denominated *water-twift*, is ufed for weaving calicoes, &c. It is fpun hard, that is, with a great deal of twift, fo that it forms a ftrong hard thread. It is manufactured of all numbers, from 10 to 60 hanks *per* pound.

The *mule-twift* is ufed for weaving muflins and the fineft cotton goods. The effential differences between this and the water-twift are, that the mule produces much finer articles than are attempted on the water-frame, at the fame time it makes a fofter thread. As it requires much lefs power to work it than the water-frame, the manufacturer fpins every thing in the mule which will admit of it; but it will only produce the foft kinds of thread. The mule will fpin all numbers, from the loweft to 150 or 170 hanks *per lb.* The trade of Manchefter is chiefly mule fpinning, whilft the water-twift is moftly fpun in the country by water-mills, becaufe the great power it requires is too expenfive for fteam-engines, at leaft the water-mills have the advantage, being ufually in fituations where they have their power at a lefs expence than thofe turned by fteam-engines.

Stocking yarn is fpun fofter than twift, and two threads are afterwards doubled together in the doubling machine, and then flightly twifted round each other in the twifting machine.

chine. Sometimes one of the threads is dyed black, or blue, before the twifting, and then it produces a fpeckled thread, which is called one-thread white. This yarn is chiefly ufed in the ftocking-frame; it is fpun in all numbers, from 10 hanks in the pound up to 60. The threads of ftocking yarn are but flightly twifted, fo that its compofition of two threads is always diftinctly vifible.

Sewing cotton is made either from twift or cotton yarn doubled, and twifted very hard together by paffing it a fecond time through the fpinning frame, fo as to form a ftrong thread, which may be compared to a fmall rope, as the two threads make one very compact and defined thread.

Mending cotton is the fame as fewing, but of lefs twift: indeed the diftinction is trifling.

Knitting cotton is twifted with two or three threads, but not fo hard twifted as fewing cotton, though it is harder than mending. This cotton is frequently bleached after it is twifted.

Candlewick cotton is a very loofe coarfe thread, made from the cheapeft and moft inferior kind of cotton: being only intended for the wick of candles, no great care is ufed in the manufacturing. A great deal of candlewick is made from tow which is bleached, and makes an article fomething like the cotton in appearance, but by no means equal to it in quality. This is known by the cant term of *bump*, and many large mills are employed in fpinning it. The cotton candlewick is known by the name of *Turkey*, which is made from Smyrna or other cheap inferior kinds of cotton. It is fpun generally about $10\frac{1}{2}$ to 11 hanks *per lb.*, and fent off to market wound up in large balls. Oxford candlewick is made from inferior cotton, about feven hanks to the pound. Wiltfhire candlewick is made from wafte cotton, about No. 7. Thefe articles are fpun without the care requifite for yarn or twift: they are ufually fpun by mules, and in fome mills for coarfe goods they do not take the trouble to form them into rovings at all, but fpin the candlewick at once from the flivers, as prepared by the drawing-frame.

To purfue the progrefs of the cotton after being fpun into twift, we muft remove from the cotton-mill to the cottage of the weaver. Here, the warp being fixed in the loom, or, in the language of the weaver, warped, it is divided to give paffage to the weft in the fhuttle, either by two, three, or more treadles: or if the pattern or courfe of changes in the order of raifing and depreffing the threads of the warp be various, fo that the weaver could not manage the requifite number of treadles, it is done by a great number of ftrings which pafs over pullies above the loom, and are drawn one after another by a little boy, above whofe head they are difpofed in two rows by the fides and between two looms. Thefe looms are, therefore, called draw-boys. Thefe boys will fhortly be fet afide for machinery, which is rapidly introducing a fubftitute. For the formation of fprigs, &c. of various colours, there are often as many fhuttles as colours, or a number of little fwivel looms, fuch as they ufe for the weaving of tapes, introduced occafionally, as many as there are fprigs in the breadth of a piece. Quiltings appear to be two diftinct cloths, tied as it were together by ditches, which go through both cloths, and in fome cafes, as in bed-quilts, there is a fhuttle which throws in a quantity of coarfely fpun cotton, to ferve as a kind of wadding. The counterpanes are woven with two fhuttles, one containing a much coarfer weft than the other; the coarfer of the threads is picked up at intervals with an iron pin, rather hooked at the point, fo as to form knobs difpofed in a fort of pattern.

When the goods are come from the loom, moft forts of them, previoufly to being bleached, are fired or dreffed, by being drawn, and that not very quickly, over red-hot cylinders of iron, by which the fuperfluous nap is burnt off. To fee fuch an operation performed upon fo combuftible a fubftance, naturally fills a ftranger with the utmoft concern and aftonifhment. They are then wafhed in a wheel with foap and water, and having been well fcoured with an alkaline lixivium, are dipped in the oxygenated muriatic acid, diluted to its proper ftrength. Thefe preparations are repeated alternately, till the goods have attained the requifite whitenefs; and between each dipping they are laid out upon the ground, and expofed to the action of the fun and air. When completely bleached, they are either fmoothed upon long tables with fmoothing irons, or calendered; that is, ftretched and preffed between a courfe of rollers, by which they acquire a fine glofs. Calicoes are printed exactly in the fame way as the kerfeymeres in Yorkfhire, but the works are ufually upon a much larger fcale. See Printing.

Thickfets, corduroys, velveteens, &c. are cut upon long tables, with a knife of a conftruction fomewhat like the fting of a wafp, terminating in a very fharp point, defended on each fide by a fort of fheath. This point is introduced under the upper courfe of threads which are intended to be cut, and with great eafe carried forward the whole length of the table.

The rapid increafe of the cotton trade appears to have been owing, in a great meafure, to the more liberal introduction of machinery into every part of it, than into any other of our ftaple manufactures. The utility and policy of employing machines to fhorten labour, have been a fubject which has exercifed the pens of many ingenious writers, while their introduction into almoft every branch of manufacture has been attended in the outfet with much riot and diforder. They are undoubtedly wonderful productions of human genius, the progreffive exertions of which neither can nor ought to be ftopped; they enable a manufacturer to produce a better article than can be made by the hand, in confequence of the uniformity and certainty of their operations, and at a much lower price, in confequence of the vaft quantities of goods they are capable of performing. They thus fupport the credit of our manufactures abroad, and enable us under the vaft load of taxes, and confequent increafe in the price of every neceffary of life, to meet our foreign competitors with advantage at market. They can even allow the goods to furnifh in their paffage a confiderable revenue to government. And although they do, undoubtedly, on their firft introduction, throw fome perfons out of employ, by changing the nature and courfe of bufinefs, they almoft immediately make up for the inconvenience by aftonifhingly multiplying the abfolute quantity of employment. If they have taken away work from carders and fpinners, they have returned it them back tenfold, as winders, warpers, weavers, dreffers, dyers, bleachers, printers, &c.

It is this machinery which we have now to explain. An extenfive cotton mill contains moft interefting fpecimens of human ingenuity and refource, and fhews in a ftriking manner what may be done, when the talents of a great number of individuals are directed to one common object, and where the moft trifling part is of fuch importance (from the frequent repetition of it which is neceffary) as to become worthy the confideration of the manufacturer to devife machinery for accomplifhing it in a better or cheaper manner. There is, in the cotton trade, fuch a fpirit of improvement, that they have, as a body, lefs prejudice in favour of old eftablifhed cuftoms than perhaps any other clafs of men: this is doubtlefs a reafon of the great perfection of their art, as they have made trials of new ideas, without thofe years of reflection which men in other trades require before they will venture to embark in any new improvement, though ever fo promifing and favourable in appearance.

Our readers, who are unacquainted with the fubject, will now by this fketch have obtained fuch a general idea of the cotton manufacture, as will enable them to comprehend the technical terms which are neceffary to be ufed in the fubfequent explanation of the machinery, and thofe references which muft fometimes be made from one procefs to another. A large cotton mill is generally a building of five or fix ftories high: the two loweft are ufually for the fpinning frames, if they are for water twift, becaufe of the great weight and vibration caufed by thefe machines. The third and fourth floors contain the carding, drawing, and roving machines. The fifth ftory is appropriated to the reeling, doubling, twifting, and other operations performed on the finifhed thread. The fixth, which is ufually in the roof, is for the batting machine, or opening machine, and for the cotton pickers, who for a large mill are very numerous. This laft is not always fo occupied, many manufacturers thinking it better to have out-buildings for thefe parts of the procefs, and only to have fuch parts in the mill as require the aid of the large water-wheel, or fteam-engine, which turns the whole mill. If the mule is ufed for fpinning inftead of the water frame, then the cards are ufually put below, becaufe they are then the heavieft and moft powerful machinery.

The firft machine we fhall defcribe is the *Batting machine*. *Plate* II. *Cotton Manufacture*, *fig* 1, is an elevation fideways, and *fig*. 2. an elevation endways, the frame being in both defcribed by dotted lines, that it may not obfcure the mechanifm: *figs*. 3, 4, and 5, are detached parts of the machine. The moving power is communicated by the mill to an horizontal axis, on which the fly-wheel, C, is fixed, to regulate the motion. On this axis four cranks are formed, as fhewn at *i*, *i*, *i*, *i*, making equal or right angles with each other; and connecting rods, *i*, *b*, being extended from thefe cranks to the lower ends of the levers *g*, *g*, which are moveable on the centres *f*, caufe them to vibrate alternately when the cranks are turned. There are four of thefe levers fituated on each fide of the machine, all the four on each fide having one common centre at *f*. Each crank on the main fpindle has two connecting rods upon it, to actuate two different levers; but which being fituated on oppofite fides of the machine, of courfe receive their motion alternately: at the upper ends, *e*, *e*, of the levers, which, as the figure fhews, are much longer than the lower ends, that is, the centre of motion, *f*, is placed confiderably beneath the middle of the levers. At the upper ends, *e*, *e*, of the levers joints are formed, by which they are connected with rods, *x*: thefe perform the batting, by ftriking in the manner we fhall defcribe upon the platform A, where the cotton is fpread. This platform is formed of a long cord, which is repeatedly paffed over two rollers, one of which is fhewn at *m*, and the other is at the oppofite end of the machine: the cord paffing round from one of thefe to the other twenty or thirty times, and having all the turns made parallel to each other, at about an inch afunder, it forms an horizontal platform for the fupport of the cotton; but to fill up the interftices between thefe ropes another ftationary fet is placed. Thefe are ftrained between two fixed beams of the frame, as fhewn in *fig*. 4, which is a plan (and a fection is fituated immediately beneath it:) The roller *m*, *fig*. 1, is kept in continual rotation by a train of toothed wheels, marked *k k k k l*, which communicate the motion by a pinion on the main axis from one to another, and laftly to the roller by means of a contrate wheel *l*, in which a pinion acts. By thefe means the endlefs rope, which extends from one roller to the other, and forms one-half of the platform for the cotton, is in conftant motion, and the cotton which is laid upon it at one end traverfes flowly to the other, receiving in its paffage the blows of the rods *x*, which ftrike upon it alternately. Their action is produced in this manner; the levers, *g*, *g*, are forked at the upper ends, as fhewn in *fig*. 5, fo as to afford a fufficient length of bearing for a fhort axis 3, 4, on which the rod *x* moves. The fmall dotted circle 3, in this figure, reprefents the place where the rod unites with the axis, or rather where a fmall iron tube proceeds from the axis; and in the end of this the wooden rod, *x*, is inferted, and held faft by means of a fcrew clamp, or hoop, furrounding the end of the tube, and compreffing it upon the rod, one fide of the tube being fplit down to admit of this compreffion. Upon the fame axis as the rod *x* are fixed two fmall pullies 1, 2, to each of which a ftrap is attached, and, after making a turn round their refpective pullies, thefe are conducted away to a fixed part of the framing, in the manner fhewn in *fig*. 1. Thefe ftraps are of fuch a length, as to hang loofe during a greater part of the time; but when, by the motion of the top of the levers *g*, *g*, *fig*. 1, they come to their tenfion, they operate upon the pullies 1 or 2, *fig*. 5, and turn them half round with their axis, at the fame time turning over the rods *x*, *x*. This motion is more clearly explained by *fig*. 3, which will, at the firft view, be feen to be only a detached fection of the parts already defcribed in *fig*. 1. A reprefents one of the vertical levers (*g*, *fig*. 1.), and F its centre of motion, upon which it traverfes from the pofition A, to that reprefented by the dotted lines B, by the action of the crank rod joined to the lower end of it, as before defcribed; therefore the two pofitions, A, B, are to be confidered as the extremes of its movement. E reprefents the pullies which are fixed on the axis of the batting rod *b*, the two appearing as one in this view. One of the ftraps of thefe pullies is faftened by one end at *n* to a fixed part of the frame, and the other end is made faft to the pulley at *o*. The other ftrap has one of its ends faftened to the pulley at *k*, while the oppofite end is attached at *i* to a lever *i m*, whofe centre, G, is ftationary. The lower end, *m*, of the lever has a ftrap attached to it, which proceeds to the lever A, and is made faft thereto at *l*. The operation of this conftruction may be thus explained: in the pofition B, the ftrap, *i f*, (anfwering to *i k* in the other pofition) hangs flack, as in the figure, while the other ftrap, *r n*, has come to its tenfion, and has turned over the batting rod to the pofition *g*. Now, fuppofe by the action of the crank rod the lever is moved towards the pofition A, it proceeds for fome diftance with the rod *g*, remaining horizontal, and merely drawing along endways; but when it is advanced rather more than half way, the ftraps, *l m* and *i k*, come to their tenfion: the former pulls the lower end, *m*, of the lever, *m i*, after it, and, of courfe, the upper end, *i*, at the fame time moving in an oppofite direction, draws the ftrap, *i k*, with it, turning the pulley E, and the batting rod attached to it, over into the pofition *b*, and ftriking on the cotton fpread on the platform. This motion is performed almoft inftantaneoufly, becaufe, the ftrap *i k* being drawn in one direction, whilft the centre of the pulley it is faftened to moves in an oppofite direction, thefe motions caufe the pulley E, and the batting rod which is attached to it, to turn over with a double velocity, to what it would have had if fimply actuated by the motion of the lever A; fo that this rapid motion caufes the batting rod to ftrike with an exceedingly fmart ftroke upon the cotton laid upon the platform. In

returning

returning back again to the poſition B, which the crank cauſes it to do very ſhortly after having made the ſtroke, it proceeds, as before mentioned, to beyond the half way, with the ſtraps hanging ſlack and having no action; but when it has paſſed rather more than half way, the ſtrap, *n f*, becomes tight, and turns the pulley over, bringing the batting rod to the poſition *g*, ready to make another ſtroke; but in turning it over to this poſition, the rod does not move with ſuch velocity as to ſtrike a blow upon the cuſhion *d*, *fig.* 1, which is placed to receive it, becauſe the ſtrap, *f n*, is fixed to a ſtationary point *n*, inſtead of having a motion in the oppoſite direction to the lever, as the other ſtrap *l k*, which cauſed the ſtroke upon the cotton. In *fig.* 1. the frame is marked B, and *o*, *o*, repreſent the levers *i*, C, *m*, *fig.* 3. The lever *g*, *fig.* 1, which is nearly in a vertical poſition, appears to have two of the rods *x* proceeding from it in oppoſite directions. This appearance is occaſioned by there being two levers in that poſition exactly behind each other, though they are moving in oppoſite directions, therefore one of the rods, *x*, remains upon the cotton at A: the other, which belongs to the lever concealed behind, is repreſented as juſt riſing from the cuſhion *d*. *Fig.* 2. is an edge view of the machine, where A repreſents the ſtrap which communicates motion to the machine by means of two pullies, called the live and dead pulley, from the circumſtance of one pulley being fitted looſe, ſo as to ſlip round freely upon the axis, whilſt the other pulley is fixed faſt upon the axis: therefore, when the endleſs ſtrap is ſhifted upon the looſe or dead pulley, it ſlips round without communicating any motion to the machine; but when it is ſhifted on the other pulley, the machine immediately commences its motion. E repreſents the fly-wheel on the oppoſite end of the axis, and B, B, B, B, are the four cranks which actuate the levers C, C, C, C: *f* is one of the rollers on which the endleſs cord or platform, D, is wound, and it extends from this to a ſimilar roller on which a wheel, *g*, is fixed; then returning again to the roller, *f*, and after having made in this manner more than twenty turns round the two rollers, the ends are ſtrained tight and ſpliced together, ſo that it appears like *fig.* 4, forming a platform on which the cotton lies, and is regularly carried from *f* to *g* by the motion given to the roller *f* through the cog-wheel *e*, and the other train of wheel-work which communicates with the main axis, as before deſcribed. At the ſides of the platform two boards are fixed which form a trough, and prevent the cotton getting off ſideways. The batting rods ſtrike down through openings or notches *d*, *d*, *d*, *d*, cut in theſe boards. The dotted lines repreſent other notches to admit the batting rods on the oppoſite ſide of the machine, which, as this figure ſhews, are not preciſely oppoſite, but the rods on one ſide ſtrike in the interval between thoſe of the others. The cotton, after paſſing along with the moving cords through the machine, is thrown off, and falls upon a table *i*, *fig.* 2, which is covered with an endleſs canvas cloth, and is ſtrained over two rollers *b*, *k*, which are kept in conſtant motion by an endleſs band paſſing round the wheels *b* and *g*. By this motion of the cloth the cotton is conveyed away as faſt as the batting machine finiſhes it, and is taken off this table by women, who diſcharge it into baſkets, in which it is conveyed to the picking room.

The opening Machine, or *Devil*.—This machine comes next to be deſcribed, being uſed for ſimilar purpoſes as the batting-machine, though it is not to be conſidered as one of the ſame ſeries, being uſed for the coarſer ſort of cotton in the ſame ſtage as the batting engine is uſed for the finer ſorts. *Plate* III. contains drawings of one of theſe machines, in which *fig.* 1. is a plan, and *fig.* 2. a ſection. In either of theſe A A repreſents a cylinder, put in rapid motion by an endleſs band paſſing round the pulley R. This cylinder has a great number of teeth fixed into its periphery, and the hood or arch, E E E E, contains a ſet of ſimilar teeth or ſpikes fixed withinſide it. This caſing conſiſts of a number of parallel bars or lags, one of which is ſhewn in perſpective in *fig.* 5: theſe are ſupported by an iron ſemicircle B B, *fig.* 3, alſo erected on each ſide of the frame. Each of theſe circles has a number of pins, P P, projecting from it, and every lag has a notch, or cleft, cut at each end, by which they are hung on theſe pins, forming a very ſimple manner of fixing the lags; but they can be eaſily removed when required, to clear the machine from the flue and impurities which it gets out of the cotton. In front of the cylinder a pair of feeling rollers, *d*, *d*, are fixed, through which the cotton paſſes to the machine: theſe rollers are fluted and placed immediately above each other, as ſhewn in *fig.* 2; then a heavy weight L, being ſuſpended from the pivots of the upper roller, cauſes them to preſs together with a ſufficient force to draw cotton in between them, and the flutes or indentations of the two rollers mutually locking into each other, they take the cotton more certainly. The lower roller is turned round by means of a bevilled wheel *l*, *fig.* 1, fixed on its ſpindle, which receives its motion from a ſimilar bevilled wheel *k*, fixed on the extreme end of a ſpindle I, fixed perpendicularly to the axis of the main cylinder, and receiving its motion therefrom by a wheel *h*, which is turned by an endleſs ſcrew *g*, cut upon the extremity of the ſpindle of the great cylinder.

The cotton is ſpread upon an endleſs revolving cloth, which is ſtrained between two rollers, *a*, *b*, and is in conſtant motion, in the direction of the arrow in *fig.* 2. This motion is communicated to the roller, *a*, by means of equal cog-wheels *d*, *d*, which are connected by an intermediate toothed wheel, as ſhewn in *fig.* 2; M S is a grating, or frame of braſs wire (ſhewn ſeparate in *fig.* 4.) which is extended beneath the cylinder, and againſt this the cotton is urged by the action of the teeth of the cylinder, and the dirt, duſt, and flue, eſcape through it. It ſhould be obſerved, that the frame for the machine is cloſely boarded up on all ſides, to keep in the duſt and flue which is ſeparated from the cotton. *Fig.* 5. ſhews the form of one of the lags, and the manner in which the teeth are diſpoſed in it, ſo that the teeth in the ſeveral rows fall oppoſite the ſpaces between the teeth of the others: at *i* is a ſmall ſlip of ſheet iron, which ſtands up perpendicular to the face of the lag like the ſpikes, and is ſupported by a kind of wedge, or prop of wood, as ſeen in the ſection of the machine, *fig.* 2. Theſe ſlips of iron run acroſs the whole length: the teeth on the cylinder are diſpoſed in a ſimilar manner, and are provided with a ſimilar iron plate. Their uſe is to retain the cotton which is worked in the machine from paſſing through too quickly, and eſcaping without being ſufficiently worked by the teeth. The cotton is ſpread evenly upon the cloth *b d*, which being in conſtant motion towards the cylinder, carries the cotton along upon it, and delivers it between the two rollers *d*, *d*: theſe give it regularly to the cylinder, which is rapidly revolving in the direction of the arrow near A: its teeth take the cotton, and carry it round between the cylinder and the hood, working it between them, to open and unravel every knot or tuft of cotton, part of which gets formed by the action of the cylinder into a ſmall roll at every one of the iron plates *i*, and this roll, by the motion of the cylinder, keeps revolving ſlowly round, ſo that every part of its circumference is ſucceſſively ſubjected to the action of the teeth of the cylinder

 as

as they pafs by them. The plates upon the cylinder act in a fimilar manner, and when the cotton is thrown out finifhed at M, upon the floor immediately beneath the feet cloth, it has been opened in every part, fo as to completely difentangle it, and the duft, cotton feeds, or any other extraneous matter, drops out through the wire grating, S M, upon the floor.

The opening machines ufed in fome of the moft improved mills, are provided with two cylinders revolving againft each other, fo that they refemble two of thefe machines put together, by which means the cotton is more completely worked in paffing through them. The cylinders have then none of the plates fixed upon them, becaufe they are unneceffary, and the fpikes or teeth are arranged in a fpiral line round the circumference of each cylinder, fo that they do not in their motion fall behind each other, and therefore work and open the cotton more effectually. Another great improvement in this double cylinder machine, is the addition of a flue or trunk, which proceeds horizontally from the opening or mouth M, where the cotton is delivered, for a confiderable diftance, and in the bottom of this is a revolving cloth, which receives the cotton as it is thrown out, and conveys it away to the end of the room containing the machine. Here it falls out into a bafket, in which it is conveyed away to the picking room. The flue or trunk at this point rifes up, and leads into a chamber of confiderable fize, and from this returns by a fmall trunk to the back of the machine. The operation of this trunk is, that the wind raifed by the rapid motion of the cylinders proceeds along this narrow trunk with a confiderable velocity, and blowing along over the furface of the cotton, which is traverfing flowly along with the endlefs cloth in the bottom of the trunk, it carries away the flue or fmall cotton with the ftream into the large chamber above-mentioned. Here, in confequence of the large area which the air has to pafs through, the current is very flow, and the flue fubfides quietly on the floor of it, from which it may be taken up in confiderable quantities every week, and is a valuable article for making candlewick, or to mix with inferior cottons for that purpofe; whereas, if fuffered to fly about in the rooms, as in the machine delineated, it does great injury to the work people, for this flue is taken into the lungs by the refpiration, caufing afthma, and pulmonary complaints: but in the improved machine, this flue is preferved for ufeful purpofes.

The next machine, in the order of the cotton manufacture, is the *Carding machine*. This is fhewn in *Plate* IV., where *fig*. 1. is a plan, *fig*. 2. a fection, *fig*. 3. an elevation, and *fig*. 4, various parts to explain the action of this machine. It will not be amifs firft to give a fhort idea of the nature of the operation to be performed by the machine. The card may be compared to a brufh made with wires inftead of hairs, ftuck through a fheet of leather; the wires not being perpendicular to the plane, but all inclined one way in a certain angle. See *fig*. 4. of this plate, where D, C, are thefe fheets of leather for a pair of cards, and A, A, or B, B, reprefent the teeth or card-wires refpectively belonging to each. Beneath is a view of one wire, infulated, fhewing the two teeth, with their bend in the fhank, or what is called knee-bend, by which they are inclined to the leather in the manner before mentioned. Now we may conceive that, cotton being ftuck upon the teeth of one of thefe cards, another may be applied to it, and combed or fcraped in fuch a direction as to ftrike the cotton inwards upon the teeth, rather than tend to draw it out. The confequence of a repetition of the ftrokes of the empty card, in this direction upon the full one, is a more equable diftribution of the cotton upon the furface of the card-teeth; and in doing this, the fibres are combed and laid ftraight. Then if one card be drawn in an oppofite direction over the other, it will, in confequence of the inclination of its wires, take the whole of the cotton out of the card, whofe inclination is the contrary way. In this mode, the operation was formerly conducted by fheets of cards nailed upon boards, which were worked together by hand. To explain how the carding machine imitates this procefs, we muft return to the figures, in which A A is a large cylinder, turned rapidly round by an endlefs ftrap on the pulley R. The furface of the cylinder is covered with cards, the fheets of leather for which are glued or nailed on in ftripes or fheets parallel with its axis, and difpofed in fuch a direction, that when it revolves in the direction of the arrow, the teeth upon it go with their points forward, fo that if a lock of cotton was held againft them, it would be drawn inwards upon the teeth. The cylinder revolves under an arch C C, lined with the fame kinds of cards as fhewn in *fig*. 2; the teeth difpofed to meet thofe of the cylinder. This arch of cards is fupported on two iron arches, fixed on each fide of the cylinder. Thefe iron arches or bridges have fpikes on them, on which the feveral pieces, lags, or flats which compofe the arch are faftened; exactly the fame as defcribed in *Plate* III. of the opening machine.

One of the iron arches is fhewn at E E, in *fig*. 2, but is not drawn off its full breadth, becaufe it would have concealed the furface of the cylinder from the fight; but in *fig*. 1. they are feen at C C, and in *fig*. 3. at *f f*. The card-teeth on the cylinder, and thefe beneath the arch, do not touch each other, but work as clofe together that a half crown can be put in the fpace between them without touching, and they are made very accurately circular, that they may always accurately preferve the fame diftance between.

B is a fecond cylinder of cards, the teeth meeting the firft, as the figure fhews. This cylinder revolves much flower than the firft, its motion being taken from a fmall pinion, *t*, *fig*. 1, on the end of the axis of the great cylinder. This works a wheel, fituated on a ftud or pin *s*; which has alfo a pinion fixed to it, working a wheel *t*, fitted on another ftud, and this carries a fmall pulley *v*, which communicates by an endlefs ftrap with a pulley, E, fixed on the end of the fpindle of the fmall cylinder. As the whole of this train of wheel-work confifts of fmall wheels turning large ones, it is plain the motion of the cylinder, B, muft be very flow. On the oppofite end of its axis is a bevilled wheel W, working another upon the end of an axis *h*, which has, at its oppofite extremity, a pinion, turning a face or contrate wheel *i*, which is on the axis of the fluted feeding rollers between which the cotton paffes, and is delivered to the cylinder. The cotton is, as was before defcribed of the opening machine, fpread out upon a feeding cloth D, which traverfes conftantly round two rollers *k* and *l l*, one of which is turned by a pinion from the feeding rollers by means of an intermediate wheel at *k*. A fmall heavy roller, or cylindrical weight, is put upon the cloth beneath, as fhewn at *f*, *fig*. 2, and, by its weight, always keeps the cloth to its proper tenfion, preferving a flat furface above, for the cotton to be fpread out upon, and then advancing with the cloth, it is thrown in between the fluted feeding rollers, which deliver it gradually and equably to the cylinder, which carries it round, and works it againft the cards fixed withinfide the arch. In this procefs it becomes very equably diftributed over the teeth in the cylinder, and gets carded in fo doing. The cotton continues in this manner hanging fometimes in the teeth of the cylinder, and fometimes in thofe of the arch, but advancing flowly from one tooth to the next, till it has paffed clear through the arch, and then it comes to the fmall cylinder B, which, as before-mentioned, is revolving flowly, in fuch a direction that its

furface

ſurface moves the ſame way as the cylinder, but much ſlower, and its teeth meet the teeth of the cylinder. Now, as before ſtated, it is the property of two cards meeting each other to diſtribute the cotton between them; therefore, the teeth of the cylinder B, having no cotton upon them, receive a full half of what is upon the teeth of the cylinder A, and as it conſtantly turns round, and bringing up freſh empty teeth, which in their turn take away the cotton from the great cylinder in a conſtant ſtream, and would ſoon empty it, but that it is ſupplied again with raw cotton from the feeding roller. The cotton taken up by the cylinder B, proceeds with it beneath, till it comes to the oppoſite ſide, and then it is removed by the *taker off*. This is a rod or iron bar *g g*, ſituated parallel to the axis of the cylinder, and cut on the lower edge with fine teeth like a comb. It riſes and falls parallel to itſelf, by being united to two rods, K, which are guided by ſliding through ſmall holes made in two ſtandards ſhewn in *fig.* 2, and the lower ends of theſe rods are jointed to two cranks *e*, *e*, *fig.* 3, formed on a ſpindle, which is turned by a pulley *p*, with an endleſs ſtrap from a pulley, S, fixed on the main axis, cloſe behind the great pulley R. Now by the motion of theſe cranks, the rod *g* riſes and falls, and at the ſame time moves a little to and from the ſurface of the cylinder B: indeed it deſcribes a kind of ellipſis, and being ſo contrived by the direction of the motion of the cranks (cauſed by croſſing the ſtrap which works them), that it is deſcending at the time when its edge is neareſt to the cylinder, and ſcrapes downwards againſt, or rather between the teeth thereof, and in conſequence removes the cotton from them the whole length of the cylinder at once: and the motion of the crank is ſo quick, that by the time this piece of cotton, ſo detached from the teeth of the great cylinder, has moved round with the cylinder, B, as much as its own breadth, the crank makes another ſtroke, and, in conſequence, the ſecond piece detached from the teeth adheres to the firſt: the third adheres to the ſecond, and ſo on. The cotton is thus *ſtripped* or ſkinned off the cylinder, B, in a continued and connected fleece. The diſpoſal of this fleece conſtitutes the only difference between the breaking and finiſhing card. In the former it is received upon a plain cylinder, about half the ſize of the great cylinder A A, which is turned round with a proper velocity by an endleſs cord from a pulley on the axis of the cylinder B, a ſmall roller reſting lightly upon the top of this cylinder with its own weight, and by its preſſure cauſes the fleece to lap regularly upon the cylinder, which continues to turn until it has made 15 or 20 revolutions. The fleece, being then broken off, forms a ſmall fleece, conſiſting of 15 or 20 thickneſſes, called the lap, which is carried to the finiſhing card, and treated exactly as the raw cotton was at firſt. The advantage of this method of treating the cotton has been explained, in a preceding part of this article, to conſiſt in the great equality thus produced in the thickneſs of the lap, which being fed to the finiſhing card will produce an equable and regular ſliver therefrom, and on this circumſtance the perfection of the ultimate thread very intimately depends.

The finiſhing card is that which is repreſented in *Plate* IV. The fleece or lap produced by the breaking card is ſpread out upon the feeding cloth D, and thus introduced to the machine, which cards it in exactly the ſame manner as we have deſcribed, and the taker off operates in the ſame way. But the fleece F, *fig.* 1, inſtead of going to the lapping cylinder, as we have deſcribed, is gathered up into a tin funnel marked *m* in *fig.* 1, and *l* in *fig.* 2: it then paſſes between a pair of rollers *m n*, which compreſs and flatten the fleece in its contracted ſtate into a pretty firm and connected ſliver or band, and deliver it into a can *n*. Theſe rollers are ſituated upon a ſpindle extending acroſs the frame, and turned round by a pulley upon the end of it, which is connected by an endleſs band with the pulley E, upon the ſpindle of the cylinder B. By theſe means the cotton is reduced from the wool to a fine regular and even ſliver, which is conveyed away in the tin can to the drawing frame, which we ſhall ſoon deſcribe.

The carding engines in many mills are provided with ſmall cylinders, known among the workmen by the technical term of *urchins*. Theſe are covered with cards, and revolve, ſo that their teeth act with the teeth of the great cylinder, through proper openings left between the top lags of the arch. Theſe ſmall cylinders are turned round ſlowly by proper bands and pullies from the main axis. Theſe urchins are ſituated in pairs, one of which operates to take the cotton off the great cylinder, in the ſame manner as deſcribed of the cylinder B; but inſtead of being provided with a taker off, to ſtrip the cotton from its ſurface, it runs cloſe to the other urchin, of ſimilar dimenſions to itſelf, but turning with a different velocity, and the teeth meeting, ſo as to take it off the firſt urchin. This ſecond urchin, having thus become charged with cotton, delivers it again to the great cylinder. The object of this contrivance is to obtain a more perfectly equal diſtribution of the cotton upon the ſurface of the cylinder, at the ſame time the urchins tend, by giving the cotton to the cylinder in a new direction, to work it more, as they prevent the cotton paſſing ſo quickly through the machine. The employment of urchins does not ſeem to afford any very great advantages, and it is not a very general ſyſtem. When an urchin is applied to the lower part of the cylinder, immediately beneath the feeding roller, it is called a *tummer*: in this caſe it takes the cotton from the feed rolls, and gives it to the great cylinder as it revolves. The great cylinder of a carding engine, as well as any other part where the flue can eſcape, ſhould be carefully incloſed by a tin plate, or thin boarding, to prevent its eſcape into the room, where it does great injury to the work people, producing an irritating and inceſſant cough, which is exceedingly hurtful, as well as the pernicious effects of ſuch extraneous matter being received into the lungs. Carding engines have been uſed with two great cylinders, ſurrounded by a multitude of ſmall urchins, in the ſame manner as thoſe uſed for wool. (See Woollen *Manufacture*.) Theſe, having two cylinders, card the cotton ſufficiently at one operation, without uſing a breaking card. The method is not near ſo perfect, becauſe the equality and regularity of the ſliver, produced by doubling the lap of the breaker 15 or 20 times, cannot be ſo completely attained by any other means, but leaves this equalization to be performed in the drawing frame. The double card, however, anſwers very well for coarſe goods, and ſaves a great deal of attendance in conveying the lap of the breaking card to the feeding cloth of the finiſher. Since the time that the drawing for *Plate* IV. was made, the cotton manufacturers have almoſt univerſally adopted what were at that time only partially employed, *viz.* caſt iron frames for the carding machines, and iron circles for the cylinders, which are covered with lags of the beſt ſeaſoned mahogany, or other wood leaſt liable to warp. Theſe circumſtances, though they do not alter the parts of the machine, are great improvements of it, as the ſteadineſs of ſuch framing, and the ſtability of their figure, enables the cylinders to run much cloſer together, without the danger of the teeth of the cylinder coming in contact at times, as they will ſometimes do in wooden frames, and thus deſtroy the card teeth very ſoon, as well as produce leſs perfect work. The ſame remark applies to all the other cotton machines, and, in point of expence, caſt iron is far cheaper than wood when

when a number of the fame part are to be made, fo that they can all be caft from the fame pattern: in point of ftability and duration no comparifon can be made; and when the mill is built fire proof, the fafety from fire is not a trifling advantage, as it faves the manufacturer the heavy expence of infurance, or, what of courfe is nearly equal, the rifk of lofing his property by fire.

The drawing frame comes next to be defcribed. *Plate* V. *fig.* 1. is an elevation of the machine, and *fig.* 2. is a plan of what is called a drawing frame of four heads, which is, in fact, a fyftem compofed of four diftinct machines of exactly the fame conftruction, but arranged on one frame, in the moft convenient pofition to be ufed fucceffively. *Fig.* 3. is a front view of one of the heads or feparate machines drawn detached; and *fig.* 4. is a fection anfwering to it. In *fig.* 1. A reprefents a clufter, confifting of four of the cans brought from the carding machine: the four flivers from thefe are paffed through the rollers of the machine, and united into one fliver, which is received in the can C, the machine having drawn it out, and extended it to four times the length of the others; it is therefore the fame fize as any one of them. The conftruction of the rollers is explained by *fig.* 3, and alfo the figure at the left hand end of *fig.* 2, in which *a b* reprefents a live and dead pulley, upon the fpindle of the principal, or front roller, by which it receives its motion from an endlefs ftrap. This roller is fhewn, in *figs.* 2. and 3, to be double, that is, it has two lengths or acting rollers upon it, each of which receives two diftinct flivers from the cans *l l*, *l l*, *fig.* 2. In *fig.* 4. thefe two lengths of rollers appear like one, being behind each other, and exhibiting the circle marked *a*, the other circle defcribed within this being the neck between the two lengths. This roller has another, marked *b*, placed directly over it, the pivots of which are retained in a vertical notch in the frame, and immediately above the pivots for the lower roller, as is fhewn in *fig.* 1; fo that the whole weight of the upper roller refts upon the furface of the lower one, the bearings or notches in which its pivots are received being only to guide, not fupport it. Another pair of fimilar rollers, *c d*, are fituated at a fmall diftance from the former, and receive their motion by pinions *c*, *d*, *figs.* 2 and 3, which are fixed on the pivots of each refpectively, and are connected by an intermediate wheel, *e*, fitted loofely on a ftud, in the manner very plainly fhewn in *fig.* 1, which alfo expreffes the grooves or notches in the ftandards; in thefe the pivots of the rollers are retained fideways upon one another, but, as before mentioned, the upper one refts upon the lower one. A fmall crofs bar, *i*, *fig.* 4, extends from the pivot, or neck, of one of the upper rollers, *d*, to that of the other one, *b*; and from the centre of this bar an iron rod, with a heavy weight, *f*, at the lower end of it, is fufpended by a hook formed at the upper end; fo that this weight, as well as the weight of the upper rollers themfelves, prefs the upper rollers, *b*, *d*, upon the lower ones, *a*, *c*, and thus the fliver of cotton, *g*, which paffes between them, is held very firmly down on the flutes in the furface of the lower roller, and cannot flip between them. The wheel *c*, *figs.* 2 and 3, which is fixed upon the pivot of the firft roller, is much fmaller in diameter than the wheel, *d*, upon the pivot of the back roller, to which it gives motion by the intermediate wheel *e*; therefore it follows, that the motion of the front rollers, *a*, *b*, *fig.* 4, will be as much quicker than the back roller *c d*, in proportion as the wheel, *d*, is larger than the wheel, *c*, which gives it motion; that is, the number of revolutions they will refpectively make in any given fpace of time (as a minute for inftance) will bear that proportion: but the back roller, *c*, (as fhewn in *fig.* 4.) is much fmaller than the other. The velocity of its circumference will, therefore, be flower than *a*, in a ftill greater proportion than the proportion of the two wheels; and the proportion is fuch, that the roller, *a b*, will, or ought to, draw four times the length of cotton through them which the back pair, *c d*, will permit to pafs in the fame time. The four flivers, therefore, being introduced from the cans *l*, *l*, *l*, *l*, *fig.* 2, between the back rollers *c*, *d*, *fig.* 4, and preffed with fuch force upon the flutes of the lower roller *c*, that they cannot flip through them, and the other pair of rollers, *a b*, holding the flivers in the fame manner at another part, the confequence of their different velocities is, that as the front rollers, *a*, *b*, *fig.* 4, move fo much quicker, they draw the fliver forwards fafter than the back rollers will fuffer it to come; it muft be drawn out, or extended in length, between the two pair of rollers, in proportion to their relative velocities, which, as before-mentioned, is the fame as the proportion between the wheels *c*, *d*, *figs.* 2 and 3, communicating the motion from one to the other, multiplied by the proportion between the diameter of the two rollers, *a* and *c*, *fig.* 4. The four flivers, after paffing through thefe in two diftinct pairs, are all drawn together through a tin funnel *f*, *fig.* 2, by means of a pair of rollers, the upper one, *i*, of which merely preffes upon the fliver lightly by its own weight, and delivers it into the can *k*: the loweft of this pair of rollers receives its motion from the pinion, *c*, on the end of the fpindle of the main, or front rollers, by means of an intermediate wheel, *g*, fitted upon a ftud or pin in the frame, and turning a pinion, *h*, fixed on the extremity of the fpindle of the lower of the two rollers. Thefe pair of rollers do not draw or extend the cotton, their velocities being accurately adapted to take up the four flivers as faft as they come through the others in two diftinct pairs, and by drawing them through the funnel, *f*, to unite the four into one, and the flight preffure of the roller compreffes them into a firm and connected fliver, which, though compounded of four, is only the fame fize as any one of the four put in, becaufe it is drawn out to four times the length, and the effect of the machine has only been to ftraighten and lay the fibres parallel to each other; for the motion the drawing produces among them, always tends to extend each individual fibre to its full length: and it is neceffary to unite feveral flivers together, or the drawing would reduce the fliver to fuch a fmall fize, that it would not bear fufficient extenfion without feparating and breaking acrofs. The plan, *fig.* 2, fhews the difpofition of four diftinct heads, or fets of rollers, A, B, C, D, all fixed upon one iron frame, E, the upright of which is fhewn in *fig.* 1. D is the firft head, or that through which the flivers from the carding engine in the cans, *m*, *m*, *m*, *m*, are firft drawn and united into one, which is delivered into the can *n*. In this head fix cans, or ends, are fhewn entering at once, in two fets of three each, and are all united into one, which will, therefore, if the rollers only draw four times, be rather thicker than thofe put in; but the number of ends put in, as well as the *draught* of the rollers, is optional: and as the command of the cotton-fpinner, who alters them for different kinds of cotton, or different kinds of yarn to be fpun as he finds beft, having the means of changing the pinions for others of different fizes. It is plain that the can, *n*, will be filled with the fliver in one-fourth or one-fixth of the time that the four or fix cans, *m m*, will be exhaufted; and, therefore, it will furnifh four cans, or ends, to the fecond head, *c*, which are placed at *o*, and drawn into one at *p*. Four of thefe, when filled, go to *q*, and are drawn into one by the head B, and delivered into *r*, which is taken to *s*, and by the head A, delivered finifhed into the can *k*, in which it is carried to the roving frame. The feveral heads, as the figure fhews, are reverfed,

reverfed, with refpect to each other, on the frame, to avoid the neceffity of carrying the cans round to the oppofite fide of the frame in paffing from one head to the next. Being thus reverfed, that is, the fliver of one moving in a contrary direction to that next it, it requires the ftraps, which turn the feveral live and dead pullies, and which all come from one common axis, on which as many drums are fixed, to be alternately croffed, and put on in the common manner.

The drawing frame in *Plate* V. has now (1812) been drawn fome years by a gentleman at Manchefter, fince which, the cotton manufacturers have very generally adopted a method of ufing three, and fometimes four pairs of rollers, inftead of only two pair in each head: by this means, they draw the cotton at two or three times, and, by extending it only a fmall quantity at each, it is found to draw much more equably than by taking the whole draught at once. The conftruction of one of thefe heads will be readily underftood, by examining a figure in the drawing (*Plate* IX.) of the fpinning-frame we fhall fhortly defcribe, which drawing the writer of this article made from one of the fpinning-frames in one of the moft complete cotton-mills in the kingdom. The rollers ufed in this fpinning and the drawing-frame are fo nearly alike, that one may be very well underftood from a defcription of the other.

The Roving-frame.—The preceding machines having prepared a fliver, of which the fibres are laid parallel, it is neceffary to reduce this fliver to a convenient fize for fpinning into a fmall thread: but to make a fufficient extenfion to effect this reduction, it is neceffary to give the fliver a flight twift as it is drawn, that it may have fufficient cohefion to undergo the fpinning.

The preparation of fuch rovings as fhall be perfectly regular in fize, and have an equal quantity of twift in every part, and which fhall be exceedingly foft, is a moft effential point in cotton-fpinning. As it is impoffible to correct thefe imperfections in the fpinning, they will be given to the thread. A great number of different conftructions of roving-frame have been in repute, at different periods, among cotton-fpinners; but it is only lately that by a machine, called the double-fpeeder, it has been brought to perfection. The old roving-can frame, firft introduced by fir R. Arkwright, is reprefented in *Plate* VI., which was drawn when that machine was much more extenfively ufed than it is now. The figure immediately beneath the title of this plate is a plan of the roving-can frame, and the figure below is a front elevation: in thefe, A is a horizontal beam fupported by ftandards at each end, and carrying the feveral heads of rollers, and is therefore called the roller-beam. The machine contains four heads or frames of rollers, each of which receives four ends or flivers from the cans, D, D. See alfo the fection in the corner. They enter two together between the back roller *c*, and are drawn out between them and the front rollers, *b*, *d*, to the proper degree of finenefs, but which varies with the quality of the yarn which is to be fpun. The fliver, after paffing through the rollers, is received into a tin can C, through a fmall funnel, N, at the mouth thereof. The can is fupported on a pivot at bottom, and is kept in rapid motion by a band, working on a pulley fixed at the bottom of the can. The neck of the funnel, N, is guided by a collar, to keep the can fteadily upright, as it revolves. The rollers of the machine are the fame as thofe of the drawing-frame: they are turned by endlefs ftraps upon the pullies, *p*, of the front rollers, coming up from fimilar pullies on an horizontal fpindle extended beneath the machine, through its whole length, and receiving motion by a live and dead pulley, E F, from the mill. The fame fpindle has pullies upon it, which, by means of bands, actuate the pullies on the bottom of the can. Thefe bands are of courfe conducted over pullies, to change their directions, from the vertical pullies on the fpindle of E F to the horizontal pullies on the bottom of the cans; but thefe are not fhewn in the drawings. Each of the bands drives two cans, paffing round the pullies of both. The cans are made with a door, to open on one fide, for taking out the cotton-roving, which falls into them from the rollers; and this door is kept clofed by a ring, which fits upon the outfide of the can, and keeps the door fhut, when pufhed down to the largeft part of the cone; but when lifted up to the top, as fhewn near N, the door can be opened, and the contained cotton taken out. L is what is called the clearer: it is a piece of wood placed over the top-rollers, and preffing gently upon them; its ufe is to prevent any part of the cotton *lapping*, that is, adhering to the roller, and being carried round with it, fo as to wind it up, inftead of drawing it through. The manner of action, in this machine, is eafily gathered from the defcription: the flivers pafs two together through the rollers, and are reduced or drawn out therein to the proper degree of finenefs; then falling into the funnels, N, of the revolving cans, they are, by the rapid motion thereof, twifted round; becaufe the centrifugal force difpofes the cotton to lie round the infide of the can in a regular coil, forming as it were a lining of cotton to the whole of the interior furface; and by this means the end of the roving becomes in a meafure attached to the can, and is twifted round by its motion, fo as to form a coarfe loofe thread, with a very flight twift, and a very foft and open fubftance. The cans, when they have been in motion fuch a length of time as the attendant knows, by experience, they will be full of cotton, the ring is raifed up, and the door opened to take out the roving, which is put into a box, and carried to a fimple machine, called the winding-block: fee the figure at the right hand corner of the plate. In this figure, which is an elevation, the box, containing two piles or coils of the roving, is plainly feen: juft above it is a cylinder of confiderable fize, mounted upon a proper fpindle, which is turned round by means of a winch: *k*, *k*, are two fmall bobbins, mounted on a wire, and receiving the end of the roving; they reft with their weight upon the furface of the great cylinder, and are by the motion thereof turned rapidly round, fo as to wind up the roving very quickly on them. The rovings are conducted through holes in a ftrip or ruler of wood, which is moved flowly backwards and forwards, to lay the cotton equally on all parts of the length of the bobbin, and make a cylindric figure to the furface of the cotton wound upon it. It is the neceffity for this winding of the cotton upon bobbins by a feparate procefs, which is the greateft objection to the roving-can frame, becaufe the tender roving is damaged by every operation it undergoes, *viz.* removing it from the cans, and winding it upon the bobbins, which muft be done preparatory to the fpinning. Another objection to the roving-can frame is the uncertainty in the manner of twifting; becaufe, when the cotton applies itfelf to the interior furface of the can, by the centrifugal force, it occafions a ftretching or draught on the roving, tending to lengthen it out before it is fufficiently twifted to make any refiftance to the flighteft draught. This would occafion no inconvenience, if the degree of draught or extenfion thus occafioned was conftant, and uniformly the fame; but this is not the cafe: for it conftantly happens that the roving, by gradually gathering from the circumference toward the centre of the can, in the manner of a fpiral, and when it arrives in the centre it coincides with the axis of the can, and of courfe, as no centrifugal force operates to draw it out in length, it merely twifts it round.

round. In confequence of thefe irregularities in the action, which are conftantly happening, the rovings thus produced are always full of thick and thin places; for when the cotton lies clofe at the infide of the can, it is confiderably ftretched by the centrifugal force, and becomes thinner and longer, and with lefs twift in any given length; but when it happens to fall in the centre of the can, it is of a larger fize, and of a more rapid twift: but the quantity of thefe irregularities is very uncertain, becaufe, even when the end of the roving, where it refts upon the coil of it, which is fettled in the bottom of the can, is in the centre of the can, it is to be prefumed that no draught will take place; but this is not certain, becaufe the roving may fwing out into a belly, and by its vibration will occafion fome draught, though not fo great as in the firft inftance. For thefe reafons, the roving-cans are not found to produce fuch perfect rovings as many other methods, and they are generally laid afide. Sir R. Arkwright faw thefe defects at firft, and in his earlieft machine devifed a pair of rollers to be placed in the mouth of the funnel of the can, which were, by very ingenious mechanifm, kept in conftant motion, with fuch a velocity as to gather the cotton fliver regularly into the can, as faft as it was delivered by the drawing-rollers. By thefe means the fliver was held between thefe rollers, and, from their revolution with the can, received a determinate quantity of twift for every given portion of length. The difficulties of this were very great, to caufe the rollers, in the mouth of the can, to take the fliver with the exact velocity required, as faft as the upper rollers delivered it; and even when this was accomplifhed, the objections we have pointed out would in fome meafure take place within the can; and after all the operation of winding the rovings upon the bobbins, preparatory for the fpinning-frame, by the winding-block, is certain to do them injury, ftretching and extending them improperly. The next improvement in roving was the ufe of *fkeleton-cans:* thefe are light frames of iron, revolving on vertical pivots, in the manner of the cans themfelves, in *Plate* VI. Within each of thefe fkeletons or frames a common tin can is placed, and revolves with them, receiving the rovings as we have above defcribed. Thefe cans, when full, are removed to a machine called the ftretching-frame, which gives them rather more twift, and extends them ftill farther in length, at the fame time winding them on bobbins, which are called cops or coppins, being bobbins with only one end, the other end being a point, fo that the cop in figure refembles a *firball*, or pine-apple. The conftruction of the ftretching-frame is the fame, except in its proportions, as the mule: we muft, therefore, defer the defcription of this method of roving till we have explained the mule, when we come to fpeak of the fpinning procefs. Many mills, where cotton is fpun on the moft improved and economic fyftem, have adopted a method of roving altogether upon the ftretching-frame, producing rovings at once from the flivers of the drawing-frame; and this method is found to fucceed very well, and be a great improvement upon the method of employing the roving-can frame. We fhall next defcribe a roving machine, called by the workmen in cotton-mills,

The Double-fpeeder.—This is a roving-frame, which is extremely perfect in its operation, making better work than any other method: it is an improvement upon fome machines made by fir Richard Arkwright, at a very early period of the cotton manufacture; but the improvements are fo effential and ingenious, that the maker or makers of them deferve the whole credit. Who is entitled to the invention of thefe improvements, we have not been informed; but we have feen machines, made by Samuel Smith of Ramfbottom, near Bury in Lancafhire, which were extremely good. The drawings, entitled *Plate* VII., or roving-frame, *Plate* I. alfo *Plate* VIII. *Cotton Manufacture*, which we have given of this machine, have, like thofe preceding it, been made before the improvements were brought to the perfection they have fince attained; and though the machine has the fame parts, the proportions are fuch, that a machine, made exactly after them, would not operate fo completely as thofe made by Mr. Smith, to whom we refer cotton manufacturers, who wifh to adopt fuch machines, rather than attempting to make them from the drawings in our plates. They will ferve, however, to illuftrate the principles and mode of their conftruction. *Plate* I. is a horizontal plan of the machine; and *Plate* VIII. is an elevation, taken in front of the machine. In this figure, A reprefents the live and dead pulley, which communicates motion to the whole: it is fixed on a fhort axis, on the extreme end of which is a pulley, B, which communicates, by an endlefs ftrap, with another pulley, D, on an horizontal axis *g*: and this has at the end a bevilled wheel, which turns another on a vertical axis *k*, at the lower end of which a conical drum or barrel, H, is fixed; and beneath this it is formed cylindrical, to receive a ftrap, which paffes round the pullies, *h*, *h*, on the lower ends of the feveral fpindles, I, I, I; and then returning to the drum again, the ends are united, and form an endlefs belt, which runs round the whole, turning them all at once with the fame velocity: *l*, *l*, are fmall rollers, fituated at intervals between every two pair of the fpindles; thefe bend the ftrap out of the ftraight line, and thus caufe it to prefs againft the pullies, *h*, *h*, of the fpindles, and apply to a fufficient portion of their furface, to turn them round. This is very plainly fhewn in *Plate* I.: each of the fpindles, I, I, I, has at its upper end a forked piece of iron, *q q*, fixed on, which is called the flyer; and one of the forks is made tubular, to receive the roving as faft as it is twifted by the motion of the flyer, and convey it to the bobbin, which is fitted quite loofely on the fpindle. The cans from the drawing-frame are, as fhewn in *Plate* I., fet behind the machine; and the flivers are drawn through a double pair of drawing-rollers, turned by means of a train of wheel-work from the main fpindle, bearing the live and dead pulley, A, *Plate* VIII. The flivers pafs fingly through the rollers, and are drawn out or extended fingly; they then pafs forwards, and two are drawn together through another double pair of drawing-rollers, the front pair of which are fhewn at *c*, *c*, in *Plate* VIII.: *a*, *b*, are the pair of wheels which turn them from the main fpindle; *f*, *f*, the weights; and *e*, the clearer. Thefe rollers deliver the fliver to the flyers, at the top of the fpindles, I, I, where it firft paffes through a collar, or eye-hole, *r*, formed on each of the flyers, exactly in the centre of the fpindle, and thence it paffes through the tube, *q*, before mentioned, to the bobbin *p*: the two back pair of rollers extend or draw out the fliver twice; then the two front pair, which are fhewn in *Plate* VIII., draw it again, and the fpindles twift it once for every inch and a half. The tube of the flyer, running fwiftly round the bobbin, lays the roving upon it as faft as the rollers deliver it out. The bobbins, *p*, *p*, are conftructed fo as to rife and fall upon the fpindles, I, I, that they may lay the roving, coming from the end of the tube *q*, regularly upon the length of the bobbin. This is done by an horizontal bar, or rail of wood, N, which has holes through it, to admit the feveral fpindles I, I, I, and the weight of the bobbin *p*, *p*, refts upon it; fo that when it rifes and falls parallel to itfelf, it takes the bobbins with it, elevating them as at *p*, in *fig.* 2. In this pofition, the bobbin receives the roving, and winds it on the lower part of them; but as the machine continues to wind, the rail with the bobbins gradually fink down; fo that every turn of the roving falls clofe to, but not upon, the former turn, thus difpofing it equally through

through all the length of the bobbins; and when they have descended to the lowest point, and the bobbins have been filled up to the top, it rises gradually up again. This ascending and descending motion of the rail and bobbins is thus produced: the vertical axis of the conical drum, H, has a bevilled wheel upon it beneath, (not seen in the figure,) which turns another, *s*, fixed on an horizontal spindle; at the other end of which is a pinion, *t*, turning a toothed wheel upon the end of an horizontal axis *v*, which carries a bevilled wheel *w*, turning another, on a vertical axis *y*, which has an endless screw at the upper end, turning a wheel, R, upon a long horizontal axis, which has two pullies or wheels, M, on it: each of these receive a chain, which chains, at the lower end, support the rail N; and when the chains wind up, they elevate the rail with the bobbins; but when they let down the chains, the rail, N, descends. The reversion of the motion which is necessary to effect this, is done by the wheel, *w*, having another bevilled wheel, exactly similar to it, fixed on the same spindle *v*, and very near to the horizontal wheel worked by it: therefore this wheel, on the spindle *y*, being made to work either in one of these wheels or the other, will, in consequence, turn round one way or the other, elevating or depressing the rail N, and the bobbins accordingly: the lower pivot of the vertical axis, *y*, is supported in a horizontal lever, which is, by the motion of the rail N, when it arrives at the highest point of its movement, moved to bring the wheel to work in the opposite bevilled wheel, on the spindle *v*; and then it turns M in a contrary direction, bringing the rail, N, down again; and when it arrives at the lowest point, the bevilled wheel is again thrown in gear with the wheel *w*, and being thus turned in a contrary direction, it raises the bobbins up again. The connecting parts by which the bevilled wheel is shifted every time it is necessary to reverse the motion, are not shewn in the drawing, but they may easily be imagined: *x*, *x*, represent the weights which are suspended from the upper front rollers, the same as those used in the drawing frame.

What we have hitherto explained of this machine is the original roving-frame, tried by sir Richard Arkwright on finding the defects of the roving-can frame. The objections to this machine in its original state were, that the bobbins, when they became filled with roving, required so much more force to turn them round, in consequence of their superior weight, than when they were empty and unloaded; that they acted, to stretch or draw out the rovings, in the same manner as the can before mentioned; for the revolution of the flyer *q*, round the bobbin *p*, gives the twist to the roving at the nose or socket, *r*, of the spindle; and if the bobbin was stationary, it is evident the roving would be lapped round it once for every turn of the spindle: but this would require the roving to be delivered out by the drawing-rollers much faster than they are intended to do. The consequence of the bobbin being fixed would be, that the roving must be stretched out to a sufficient length to supply as much length as the motion of the end of the tube of the flyer, *q*, requires. Now suppose, instead of the bobbin being fixed stationary, it is only retained by the friction of resting its lower end upon the rail N, the roving will then only be stretched with as much force as will drag the bobbin round after the flyer, with as much velocity as the difference between the quantity of motion of the end of the flyer, and of the roving, as delivered out by the drawing-roller: this difference will enable the bobbin to take up all the roving as it is made.

Now it is plain, that to drag a heavy bobbin thus about, must require more strain on the roving than for a light bobbin, and in consequence, it is always drawn out smaller towards the time when the bobbin becomes filled. This is particularly hurtful, because the roving, which will afterwards spin to the greatest advantage, is so extremely delicate as not to be able to bear the slightest strain; and if the machine requires it to undergo any strain, it must be twisted harder, and this will render it less fit to undergo the spinning. The manner in which these objections are obviated in the double speeder, is by introducing machinery which will give motion to the bobbin, and turn it round with such a velocity, that it will take up the roving just as fast as it is produced; but it is necessary, in effecting this, that the velocity shall be altered every time the bobbin has a new layer or roving beginning to be lapped upon it, because every time this happens the bobbin increases in its diameter, and must therefore move in such a manner as will cause its acting circumference to keep the same velocity at all times. To describe this see *fig.* 1, where for every bobbin, *p*, a small pulley is shewn resting upon the rail N, the spindle passing through its centre. The bobbin, which rests upon it, has a hole made in the underside of it, and the wheel having a pin entering this hole, so that the wheel, being turned round, compels the bobbin to turn with it. An endless strap, *n*, passes round all these wheels, having binders *o*, or pullies, which bend the strap, and cause it to act upon a sufficient part of the circumference of the wheels, to take such hold as will carry them round. This endless strap also passes round a cylindrical barrel L, fixed upon the upper end of the conical barrel K, which is of the same dimensions as the barrel H, but inverted, that is, the large end of the barrel, H, is opposite the small end of the barrel K. This being the case, an endless strap, *m*, which is passed round both, will communicate the motion of one to the other, and if the axes of the two cones are parallel, the strap will preserve the same tension, whether it works at one or other end of the two cones, because whatever quantity the strap will be loosed by acting on a small part of one cone, it will at the same time be tightened, or taken up as much, by being upon the larger part of the opposite cone; but it is plain that this alteration of the acting point of the strap will produce a correspondent alteration in the velocity of the motion of the cone K, which is turned round by the strap. Thus, the motion of the cone, H, is equable and uniform in velocity, being actuated by wheel-work from the principal spindle of the machine. Now suppose the strap, *m*, at the top of the cone H, then it acts with a small diameter upon the large diameter of the top of the cone K, which therefore moves much slower than H. Now by shifting the strap lower down upon the cones, the acting diameter of H is increased, while K diminishes till they come to a point, where they will be of equal diameter, and of course have equal velocities; but beneath this point, the diameter of K will be the smallest, and of course its velocity will be greater than H, which actuates it. When the machine is first put to work, and the bobbins are all empty, they must move slowly, because they are required to follow the flyer round, so that they will only take up as much as the rollers produce; for if they were stationary, they would gather up, as before-mentioned, as much as the motion of the end of the flyer, therefore, within certain limits, the slower the bobbin moves, the more it will take up; and if it moved as quick as the end of the flyer, it would take up none at all. For this reason, at first starting the machine, when the bobbins are all empty, the strap, *m*, must be at such a height up the cones, that the bobbins will have their proper velocities to wind up the rovings as fast as they are required, and the bobbins rise or fall, as is requisite, to lap the roving equably upon them; but having thus covered each bobbin with one layer of roving, and beginning to wind another layer upon it, the acting diameter of the bobbin is increased, increafed, and it muft therefore turn fo much quicker, (that is, it muft make fo many more turns in any given fpace of time,) as will caufe the increafed acting circumference to wind up no fafter than it did when it was fmaller. This feems, at firft hearing, to be a paradox, that it fhould be requifite to turn round quicker to wind up no fafter upon the increafed radius; but it is to be confidered that, by the bobbin being moved quicker, it follows and keeps nearer the end of the flyer tube, and therefore winds up lefs, becaufe the quantity which the bobbin will take up depends on the difference between two motions, that is, the difference between the flyer and that of the bobbin which follows it. This increafed velocity of the bobbin is occafioned by the ftrap, *m*, being, at the time when the bobbin is filled with roving up to the top, or down to the bottom, depreffed or fhifted down on the cones a fmall quantity, which occafions, as before-defcribed, a fmall increafe in the velocity of the motion of the cone K, and of the bobbins. The depreffion of the ftrap is performed by a lever, which takes hold of the ftrap with a fork, and when urged, leads it up or down upon the conical barrel. This lever is actuated by a fnail, upon the axis of which is fixed a ratchet-wheel, turned round by proper clicks, levers, and other connecting mechanifm, one tooth every time the bobbins and rail, N, begin to afcend and defcend, or, in other words, arrive at the extreme limits of their motion. Then the fnail acting on the lever depreffes the ftrap a fufficient quantity, to produce the alteration of velocity required.

Thus, as the bobbins increafe in diameter by the addition of fucceffive layers of the roving, they adapt their velocities to that increafe, and taking it up juft as faft as it is produced, and no fafter, fo that the roving, as it paffes from the end of the flyer tube to the bobbin, is never ftretched, and never becomes flack. The intelligent mechanic will readily percieve that this is practicable, but at the fame time he will be fenfible of the accuracy requifite in the adjuftment of fuch a machine to its work, and the difficulty of making this adjuftment for different fizes of roving. This, perhaps, is the only bar to its general ufe, that it requires a fkilful mechanic to attend and take charge of it, becaufe every different fize of roving, which is made in it, will require a different rate of increafe or decreafe of motion, by means of the ftrap *m*, for a large thread caufes the diameter of the bobbin to increafe more rapidly than a fmall one, and therefore the quantity of fhift which the ftrap, *m*, makes every time on the two cones K, H, muft be determined by the fize of the roving, as is alfo the height at which the ftrap fhall ftand when the machine is firft fet to work, and the bobbins are all empty. Thefe adjuftments are made in the lever fnail, and other connecting mechanifm, which are omitted in our plates. We have attended for a long time to the action of feveral double fpeeders of this kind, made by Mr. Smith, and adjufted by him, which performed their work in the moft perfect manner, making a roving fo loofe and foft, that it would part with the flighteft force, but at the fame time as regular and even as poffible, and the yarn fpun from it was greatly fuperior to any which could be produced from the fame material by any other means we have feen. We venture to prognofticate that the general introduction of this machine, when a fufficient number of managers are inftructed how to make it work properly, will be a great improvement of a moft effential department in cotton fpinning.

The rovings, thus prepared on bobbins, are carried to be fpun, either, as before explained, in the water-frame, or mule. We fhall defcribe the former firft: it is conftructed in two very different forms; and though in both the operating parts are the fame, the machinery which actuates them are very different. One is called the water frame, being the original fpinning frame, as firft conftructed by fir Richard Arkwright, whilft the other is a more modern conftruction, and is known by the name of the throftle frame. Their comparative advantages we fhall fpeak of after having defcribed them both by the aid of drawings made from the moft improved machines of both kinds. See *Plate* IX. which contains a drawing of

A Water fpinning frame, taken by the writer of this article from Meffrs. Strutts' mill, Belper, Derbyfhire, whofe works are the moft complete for the water-fpinning trade of any in the country. *Fig.* 1. is an elevation in front of the whole frame; *fig.* 2. an elevation endways, and *fig.* 3. is a plan: the remaining figures are the parts on an enlarged fcale. In all the three firft figures, the fame parts are defignated by the fame letters of reference: A is a bevilled wheel, fixed upon the horizontal axis, which extends through the whole length of the mill. This turns a fmaller bevilled wheel upon a vertical axis B, which has a drum, C, at the lower end, and by a ftrap, *a*, actuates the whole machine. Another ftrap, *b*, goes the other way, and works another frame on the oppofite fide, the drum, C, being common to both. The fpindle, B, paffes through the drum, C, with a circular fitting, fo that it flips freely round within it, without giving motion to the drum, except when it is caft into gear. This is done by two locking bolts, fhewn by dotted lines paffing through the drum, and both fixed into a collar or focket-piece *d*, fitted to flide up and down the fpindle. It has a groove formed round it, in which a fork, at the end of a lever *e*, is received, fo that the fork embraces the piece, *d*, in the groove, and when lifted up, raifes the two locking bolts with it. This lever is raifed by the power of a fecond lever D E, the extremity, E, of which, being depreffed, raifes up the lever *e*, and unlocks the drum from the fpindle B, by withdrawing the locking bolts from their contact with an arm, *f*, of a wheel, *g*, which is fixed faft on the fpindle beneath the drum, and therefore turns with it; but the locking bolts being let down, that their ends may project through the drum, and intercept the crofs arm, *f*, of the wheel, the drum and all the machinery are put in motion.

The endlefs ftrap, *a a*, paffes, as fhewn in the figure, the whole length of the frame, makes a turn round the pulley *m*, and comes back again. Other pullies, 1, 2, 3, of the fame dimenfions as *b*, are fituated, at intervals, in a direct line between the drum *c*, and the pulley, *m*, to bear the ftrap, and in the intermediate fpaces between thefe pullies, the vertical fpindles marked *n* are placed in pairs, exactly oppofite each other. On the lower end of thefe, fmall wheels, *x*, called binders, are fixed, and the ftrap, *a a*, preffing againft them, as fhewn by the figure, turns them round, the object of the pullies 1, 2, and 3 being to bend the ftrap out of the ftraight line fufficiently, to make it apply to the furfaces of the feveral binders and turn them round. The laft pulley, *m*, is fitted in a frame, and can, by a fcrew 4, be moved to ftrain the ftrap tight. Above each binder, and on the fame fpindle, a wheel, *h*, is fixed: it receives two belts *i*, *k*, (*fig.* 3.) which turn four of the fpindles *l*, *l*, *l*, *l*, each belt giving motion to two fpindles. The binders *x*, (fee *fig.* 5.) are fitted to flip round on their fpindles *n*, but can, at any time, be united thereto, to give them motion by a locking bayonet 9, which is caft in or out of action, at pleafure, by a fmall lever 10, in exactly the fame manner as the locking of the principal drum: therefore, by the lever 10, any four fpindles can be detached from the machine at pleafure. The fpindles, *n*, of the binders have each at the upper end a pinion, which turns a face or contrate wheel *p*, fixed upon the fpindle of the front rollers which give out the cotton to the fpindles. Thefe rollers are arranged in diftinct heads or frames, containing four lengths in each, which fupply four fpindles. The

The conftruction of one of the heads is fhewn in *figs*. 4, 5, and 6; *fig*. 4. being a fection of the rollers and fpindle; *fig*. 5. a front view of the rollers; and *fig*. 6. an end view. In thefe, *p* ftill denotes the face wheel, and 4 the lower front roller. Upon this, which is fluted in the acting parts, the upper rollers 5, made in two feparate lengths, reft, and are preffed down upon the lower one by two heavy weights, 6, 6, which are fufpended, by means of hooks, 7, from the necks or fmall parts of the upper rollers, and thus keep them firmly down upon the flutes of the front roller 4. On the oppofite end of the front roller to the wheel *p*, a pinion, *r*, of eleven teeth is fixed: this turns a wheel, *s*, of 28 teeth, which is mounted on a ftud or pin, and has a pinion, *t*, of 16 teeth fixed to it, which works a wheel, *w*, of 32 teeth, fixed on the end of the middle roller, fhewn in the fection, (*fig*. 4.) at 12, whofe motion will be to the front roller nearly as five to one. On the other end of the roller is a pinion of 10, which turns another of 15, on the back roller, 13, by means of an intermediate wheel, fo that this turns only once for one and a half turns of the middle roller; confequently, the roving 14, (*fig*. 4.) which is introduced between the back rollers, from the bobbins or cops fet up in a frame F, (*figs*. 1 and 2.) above the machine, is, in paffing between the back and middle rollers 12 and 13, drawn out one and a half times; then between the middle and back rollers 12 and 14, it is extended five times more, making a draught or extenfion of $7\frac{1}{2}$ times in the whole; and as faft as the rovings come through the front rollers, they are twifted into a thread by the rapid circular motion of the fpindles. But thefe we have to explain; they are ftraight fteel arbors, *l*, *l*, (*fig*. 4.) on the lower end of which the whirls or pullies, which receives the band, *i*, for them, are fixed: thefe fpindles are mounted in a frame common to them all, which confifts of two rails 14, 14; the lower one fupporting the points or toes of the fpindles, and the other having bearings for the cylindrical parts of each fpindle, and a ftrip of wood is fcrewed againft this to keep them up to their bearings. Above this bearing the fpindle is only a ftraight cylindrical wire, and on the upper end of it the flyer, 15, is faftened, either by fcrewing it on, or it is ftuck faft on by friction, which is fufficient to carry it about. The two arms or branches of the flyer are fufficiently diftant for them to revolve round clear about the bobbin 16, which is fitted loofely upon the cylindrical fpindle, and with liberty to flide freely up and down upon it. The weight of the bobbin is fupported by refting on a piece of wood 17, attached by fcrewing to a rail M, which has a flow rifing and falling motion, equal in extent to the length of the bobbin between its fhoulders, by which means the thread, as it comes through the eye formed at the ends of either of the branches 15, of the flyer, and is wound by the motion thereof upon the bobbin, becomes equally diftributed throughout, its length giving it a cylindrical figure, inftead of heaping all the thread at one part, like a barrel, as would happen if the bobbin did not rife and fall. This motion of the bobbin is produced by a bent lever, 16, (*figs*. 1. and 2.) fufpending the rail M, with all the bobbins upon it, from the arm 16; the lower end of the other arm, 17, bears againft, and is moved by a heart or eccentric wheel 18, nearly of the figure of a heart, which is fixed on an horizontal axis extending the whole length of the machine, and at the other end it bears a fimilar heart 18, (*fig*. 1.) fixed on it, which operating upon another lever 16, fufpending the other end of the rail M, thus caufing it, when the hearts are turned round, to rife and fall equally at each end, or parallel, and move all the bobbins refting upon it together. The motion is given to the fpindle of the heart 18, by a fmall contrate wheel on the end of it, which is turned by a pinion on the lower end of the vertical fpindle 19, receiving its motion by a pair of bevilled wheels from an horizontal fpindle 20, in the middle of which is a cog-wheel 21, turned by a fpiral piece of iron 22, which is fixed on the main fpindle B, juft beneath the great bevilled wheel. It operates in the fame manner as an endlefs fcrew, turning the wheel, 21, round one tooth for every revolution of the main fpindle, and this flow motion is communicated by the fpindle 19, and wheel-work juft defcribed, to the hearts, which revolve with fuch a velocity, as will caufe the bobbins to afcend and defcend fo faft, that they lie every turn of the thread clofe by the fide of that preceding it, but not upon it, fo that the figure of the bobbin, when filled with thread, will be nearly cylindrical.

The bobbins of the roving frame are put upon a wire, or temporary fpindle, and in this ftate are fet up in the frame, F, in two rows, one above another, fo that they will all turn freely round when the rovings are drawn off from them. Thefe rovings are conducted over wires, as fhewn in *fig*. 2, to lead them in the right direction, and are brought, two together, through wire ftaples fixed in the board G (*fig*. 4.), then through notches made in the edge of a piece of iron plate fixed on the edge of the board, and projecting up above the furface of it, and after paffing through thefe notches the rovings enter the back roller 13, in *fig*. 4. The board, G, has a fhort traverfing motion backwards and forwards, by which means it caufes the roving to travel backwards and forwards between the rollers, or it would foon, if conftantly conducted through the fame part of the rollers, wear out the flutes at that part, making a fmooth ring round it: but by this traverfing motion the wear is equally diftributed over the whole length of the fluted rollers, and does not act partially at any one part. The motion is caufed, as fhewn in *fig*. 4, where 18 is the fpindle of the hearts 18 (*fig*. 2.), fituated immediately beneath the board G: it has a cog-wheel of 18 teeth fixed upon it, turning another, H, of 36 teeth, on the axis of which a fmall crank, K, is formed, and by means of a connecting rod draws the board, G, backwards and forwards every time it makes a revolution, by means of the cog-wheels, which will be once for every two turns of the hearts. The rovings, two together, as before ftated, enter between the back rollers, and then pafs forwards to the middle pair, receiving in the paffage a draught or extenfion of one and a half; then advancing through the middle rollers to the front, they are, by the motion thereof, drawn out five times, and in this ftate delivered to the fpindle L, which twifts the fibres round each other the inftant their ends come out, before the rollers leave the other ends, or they would fall to pieces, being drawn out fo fine, that the cohefion of the fibres is infufficient to bear any thing, and the twine given to the roving is entirely loft, for it was at firft only one turn in $1\frac{1}{2}$ inch in length; and this $1\frac{1}{2}$ inch, being by the draught of the roller drawn out to more than 13 inches, the twift of one turn in this length is imperceptible, and adds no ftrength whatever to the roving, fo that it is neceffary the fpindle fhould, by the connection of the thread 41, paffing down from the rollers to its flyer, give a twift to the fibres the inftant they come through the roller, fo that by twifting one end of each fibre round the other, whilft the oppofite ends are held faft between the rollers, they will become a thread fufficiently cohefive to advance towards the fpindle, and receive its full quantum of twift to become a hard and ftrong thread: it paffes through a wire eye or ftaple fixed in a board at 34, which changes its

 direction

direction into a line with the fpindle, to which it is connected by paffing through the eye formed at the end of either of the branches of the flyer, which revolves with the greateft rapidity along with the fpindle, and thus give twift to the thread. The bobbin does not partake of the motion of the fpindle, but is retained by the friction of its lower end refting on the piece of wood 17, and this is increafed by a wafher of leather put under it: then, as before explained of the hobbin of the roving frame, the thread, by the motion of the flyer, drags the bobbin about after it with a velocity equal to the difference between the motion of the end of the flyer, and the motion of the thread as delivered out by the front rollers. When the frame has been fo long at work, that the bobbins become filled with thread, the child in attendance, by the handle of the lever 10 (*fig.* 5.), difengages the binder *x*, of the four fpindles from its axis *n*, and then they, as well as the head of the rollers belonging to them, ftop, and the child breaks the thread; then pulling off or unfcrewing the flyer, he lifts off the bobbin, puts on an empty one, on which the end of the thread is previoufly lapped to make a beginning: the flyer is next fixed on, the thread paffed through the eye at the end of the flyer, and it is ready to work again: the eye of the flyer is made open at one part, being curled in the manner of a cork-fcrew juft at the end fo that the thread can be hooked in and out of it by the child, but is in no danger of getting out by the motion of the flyer in its work. When a thread accidentally breaks, it is not always neceffary to ftop the fpindle to unite it, but the attendant takes hold of the broken end which belongs to the bobbin, and draws off a confiderable length, a yard for inftance, from the bobbin, and breaking it, throws this away, becaufe it has every chance of being unfound: then taking the end in the finger and thumb, and applying it againft the end of the roving which is coming through between the rollers, leaving them overlapping a fmall quantity, and letting them go from the finger and thumb, the ends are inftantly twined together, and united into one found thread. But this requires fome dexterity, for if the end of the thread is held fo long between the fingers in applying them together, that the roving coming through the rollers advances the length of the fibres of the cotton before it is let go, and fuffers the fpindle to twift it, the fibres will part and the thread breaks afunder, or is never formed at that part; it is therefore neceffary to catch the roving as clofe as poffible to the rollers, and apply the end of the thread quickly to it, then letting them go inftantly, the fibres are twifted in with each other, and the union takes place fo perfectly, that it cannot be afterwards difcovered where the joint was made. The lower rollers are made of caft iron, turned extremely true, and fluted by an engine; the upper rollers are alfo caft iron, but are covered with leather in the acting parts, fo that this foft fubftance holds the cotton more firmly upon the flutes of the lower one than any other method would, as the roving is not liable to lap round the rollers like the fliver of the drawing frame. No clearer is ufed; but inftead thereof, a fmall wooden roller covered with leather is placed over, between the front and middle roller, but it merely lays upon them, having no pivots or fupport; its furface is rubbed over with chalk or whiting, and this it communicates to the leather of the upper roller, and is found to improve their action, probably by not fuffering the cotton to flip beneath the rollers: *fig.* 4 fhews, that the middle and back rollers have their weights to keep down the upper rollers upon them in the fame manner as the front rollers; but the weights are very different, the front weight, 6, being 20lbs., whilft the middle weights are but a few ounces, and the back rolls have a weight of 2lbs. The reafon for the front roller requiring fo great a weight is, that it is neceffary for them to prefs and hold every one of the fibres of the roving while paffing through them extremely tight; becaufe if it only held a few in the middle of the roving, the others towards the edges of the roving might, by the twifting, be drawn out before their ends were fairly twifted into the thread, and this would render the thread fuzzy in its whole length: the inftant the foremoft end of a fibre comes through between the rollers, it fhould, by the twine of the fpindle, be twifted over the middle of fome other fibres which are coming through, and over the ends of others which have altogether efcaped the roller, and the fmoothnefs of the furface of the thread altogether depends upon this being done inftantaneoufly on the foremoft end prefenting itfelf through the rollers; for the effect of all the preceding operations has been to difperfe the ends of the fibres equally, fo that they effectually break joints with each other, and then being equally twifted, it forms a thread of equal ftrength in all parts.

The numbers of the wheel-work for the rollers of the roving frame, are varied with every different number of cottons which is to be fpun; the draught being altered, when requifite, to produce fuch an extenfion of the fliver in paffing through the rollers, as will make the roving, when finifhed, 4.3 times the weight (length for length) of the yarn it is to be fpun into. This is a pretty general rule in cotton-mills, and the roving is occafionally meafured and weighed, to afcertain if the machines are drawing the proper quantity, and if not, the pinions are changed for others which will produce the proper degree of extenfion. It is in this ftage that the fize of the yarn is determined, and the fpinning frames have, in general, the fame draught; but the velocity of the fpindles with refpect to the roller, fo that they will give a greater or lefs degree of twine to any given length, is varied in fpinning different kinds of twift, whether hard or foft twift. The alteration is made by employing larger or fmaller pullies, or whirls, on the fpindles which caufe them to revolve with a flower or quicker motion. Neither do the rollers of the fpinning-frame give out the fame quantity of roving in a given time when fpinning coarfe or fine goods, or when fpinning very high numbers, as No. 60: the front rollers are adapted by the wheel-work to revolve at the rate of 35 times *per* minute; but for coarfer goods, fome of them will turn 60 times *per* minute: this is becaufe a fine thread requires more twift in a certain length than coarfe.

The frame from which the drawing was taken contained ten heads, or forty fpindles, on each fide, the frame = 80, and the fame on the oppofite fide of the drum, to be driven by the ftrap *b*, making 160 fpindles, actuated by one cog-wheel A.

The conftruction of the locking bayonet *d*, for connecting the drum with the main fpindle, we have explained; but one circumftance was then unnoticed, *viz.* that the bar *f*, *fig.* 1, is not permanently fixed to the wheel *g*, but that the wheel has a groove turned in the edge of it like a pulley; and an iron hoop or clip, made in two halves, fcrewed together, is fitted round the wheel in this groove, and to this clip the crofs-bar, *f*, is united, by the ends of it turning down, and being received between the ends of the clip, the fame fcrew-bolts holding all together. The confequence of this conftruction is, that the machine is not fuddenly jerked into motion when the bayonet is let down, and intercepts the arm *f*, which is revolving rapidly with the fpindle and wheel *g*: inftead of jerking the frame, the bar, *f*, for a moment becomes ftationary againft the point of the bayonet,

bayonet, the wheel, *g*, ſlipping round within the clip, but the great friction of this ſoon ſets the machine quietly in motion; and when it arrives at its full ſpeed, the friction of the clip is ſufficient to keep it in motion, without ſlipping any more, unleſs an accident happens, and then it is very uſeful, as it prevents the machine being broken.

The *throſtle ſpinning-frame* is delineated in *Plate* X. of which *fig.* 1. is a ſection taken acroſs the length of the frame; *fig.* 2. is an end view, and *fig.* 3. is an elevation of the machine in front. After the minute deſcription we have given of the conſtruction and operation of the roving-frame and water-frame, it will not be neceſſary to be very diffuſe in our account of this machine, which has the ſame parts as thoſe machines, but only differs in dimenſions and proportion. The ſame letters of reference are employed in all the figures, and A A repreſents the live and dead pulley actuating the whole, fixed on the end of the ſpindle of a long tin cylinder B, which is called the throſtle, and turns all the ſpindles and other machinery at once. On the main ſpindle of the throſtle a pinion, *a*, is fixed: this turns a wheel *c*, which has a pinion, *b*, fixed on it, turning the wheels D and E (*fig.* 2.) by the intermediate wheels, *d*, on one ſide, and *e* and *f* on the other. The wheels, D and E, are fixed on the ends of the ſpindles of the front rollers X, as is plainly ſhewn in *fig.* 3. Theſe rollers are made in lengths, which ſerve ſix ſpindles, and the lengths are united by connecting boxes, as ſhewn at F, to other lengths, ſo that one train of wheel-work, *a* C *b d e f* E and D, will turn the front rollers for 112 ſpindles, or 66 on each ſide of the frame, and then the rollers are made in 11 lengths. Some frames are longer, others ſhorter than this. Our drawing only contains 12 ſpindles, and two of theſe at each end are removed, to ſhew the works inſide of the frame: at *g* a pinion is fixed on the ſpindle of the front roller, and turns a wheel on the end of the middle roller, by an intermediate wheel and pinion on a ſtud; and at the oppoſite end of the middle roller is a wheel *h*, turning the back roller with its proper velocity by means of an intermediate wheel, ſo that the motion of the rollers in this frame is exactly the ſame as in the water-frame. The ſpindles, *l*, *l*, are all driven by bands from the throſtle cylinder B, the manner in which they croſs being ſhewn at *k*, *fig.* 1. The bands are very looſe, and, as the figure ſhews, are inclined, ſo that their weight tends to draw them tight, and turn the ſpindles, *l*, *l*, about with the proper velocity; but ſtill the child attending the machine can, by preſſing his knee againſt the whirl, as the pulley is called, ſtop the motion of any one ſpindle for a moment whilſt a broken thread is repaired, the band ſlipping round it all the time. The ſpindles, being exactly the ſame as the water-frame, need little explanation, more than to enumerate their parts, which are, the bobbin *m*, the flyer *n*, ſtuck by friction, or elſe ſcrewed on the top of the ſpindle, and its branches ending in a curled hook, through which the thread is paſſed to the bobbin. This is fitted quite looſe on the ſpindle, and reſts its weight on a piece of wood *o*, fixed to the underſide of a rail N, which riſes and falls, to lay the thread regularly in a coil upon the bobbin, as faſt as it is taken up thereby. The riſe and fall are thus produced: the two rails, N, N, on oppoſite ſides of the frame, are ſuſpended by iron rods, *p*, *p*, from horizontal levers G, which are mounted on an axis, extending the whole length of the frame, and having as many of the levers, G, upon it, as are neceſſary to ſuſpend the rail, N, without bending. H is an iron rod jointed to the lever G, and coming down to a ſhort lever I, which, at the oppoſite end to its connection with H, reſts on the ſurface of the heart R, fixed on a ſpindle, which is turned by the following train of wheel-work. The ſpindle of the wheel and pinion, C *b*, paſſes through the frame, and by a pair of bevilled wheels, L (*fig.* 3.), turns a vertical axis M, on the lower end of which is an endleſs ſcrew, giving a ſlow rotation to the ſpindle of the hearts by a tooth-wheel, *m*, thereon, which is turned round one tooth by every revolution of the endleſs ſcrew. A heavy weight, P (*fig.* 1.), is ſuſpended from the lever, G, to counterbalance, and cauſe the end of the lever, I, always to preſs upon the ſurface of the heart R, which, as it turns round, elevates and depreſſes the bobbins on the oppoſite ſides of the frame alternately. The joints of the levers, G and I, with the rods, H and *p p*, are made, as the figure ſhews, adjuſtable; that is, the centre pins are fixed to the levers by fitting in grooves, and are held in by nuts, ſo that they can be fixed at different diſtances from the centre, to accommodate the acting radius of the levers, ſo that the motion given by the heart, R, may be made to correſpond with the length of the bobbin between the ſhoulders.

The bobbins for the roving are ſet up in a frame at S S T, between the two ſets of rollers, X, X, and the roving is conducted immediately between the back rollers: but, as it goes through the ſame proceſs as before deſcribed in the water-frame, it is needleſs to repeat it. The traverſe motion, to prevent the cotton wearing away the rollers in any one part, is ſometimes omitted; but we have ſeen throſtle-frames in which the whole of the frame S T, conſiſting of one board, S, below, and another, T, above, connected by proper pillars, together with all the bobbins of rovings, had a ſmall traverſe motion, which is found to be a great advantage in the wear of the rollers.

Reſpecting the comparative advantages of the throſtle-frame and the water-frame, cotton-ſpinners are divided in their opinions: the ſimplicity, and conſequently low price in the firſt erection of the throſtle, is its recommendation, and it is generally ſtated to be driven with far leſs power, becauſe it has fewer parts. To ſet againſt theſe advantages, it is ſaid, that when the bobbins are filled, and require to be changed, the whole frame of 112 ſpindles muſt be ſtopped at once, by ſhifting the ſtrap to the dead pulley A; whereas in the water-frame, any four ſpindles can be ſtopped together, by caſting off their binder; and it is only neceſſary to ſtop the whole frame by the caſting off the great drum, when the frame is to be repaired, or is out of uſe for a day, or longer period.

We have now explained the manner of ſpinning cotton into a thread by the water-frame, and ſhall proceed to deſcribe the conſtruction of the other method of ſpinning, *viz.*

The Mule.—This machine was introduced by a Mr. Crumpton, who lately received a reward of 5000*l.* from parliament for the invention, which, as before mentioned, conſiſted only in the combination of Hargreave's ſpinning jenny with ſir Richard Arkwright's drawing rollers. *Plate* XI. contains drawings of one of the beſt conſtructions of this machine, in which *fig.* 2. is an end view of the whole machine, and *fig.* 1. an end view of the carriage alone. *Fig.* 3. is a front view, and *fig.* 4. is a view of the operative parts detached: *fig* 5 a ſimilar view in another ſtage of its operation. As this machine is extremely complicated in its movements, it will firſt be proper to explain theſe movements before entering upon the machinery which cauſes them. This is ſhewn in *figs.* 4 and 5, where W repreſents a bobbin of the roving frame ſet up in a proper frame, and the roving is conducted from it, through three pairs of rollers, A, B, and C, which have the ſame draught as the rollers

rollers for the ſpinning-frame, and are moved by ſimilar wheel-work: but the upper rollers, *a*, *b*, *c*, are weighed down in a different manner: thus, *d* is a piece of metal reſting on the neck of the front roller, *a*, at one end, and the other end upon the middle of a ſecond piece *e*, which bears upon the necks of the other two pairs of rollers, *b* and *c*; then an iron rod *f*, coming down from the piece *d*, loads all the three upper rollers *a*, *b*, *c*, at once, by means of a lever *g*, which is hooked beneath a fixed rail of the framing ſupporting the rollers at one end, and the other is made with a heavy knob, ſo that the purchaſe, or leverage of this piece *g*, draws down the wire, *f*, with ſufficient force to load all three rollers with their relative forces: thus it is plain the roller, *a*, muſt bear the principal weight of the lever *g*, becauſe the wire, *f*, is nearer to the roller *a*; but as it acts upon the piece, *e*, with a conſiderable length of leverage it bears lightly upon it, and this again bears upon two, and therefore ſtill leſs upon either, the weight of the end of *d* being divided upon two rollers *b*, *c*; but it bears moſt powerfully upon *c*, the point or end of *d* being neareſt to that roller, ſo that the operation of all theſe pieces is to load the three rollers nearly in the ſame proportion as the rollers of the ſpinning frame: but this proportion can readily be altered by ſhifting the acting lengths of the levers.

The roving, after paſſing through the rollers, is taken up by the ſpindle D G: this is placed rather inclined, but without any bobbin or flyer, like the ſpindle of the water frame; it is merely a plain conical arbor, ſupported at its point, or toe, in a ſtep made on the rail, E, of the frame, and in a bearing at F, againſt another rail. It has nothing to keep it up againſt this bearing, the draught of the band, which paſſes round the pulley *b*, and gives motion to the ſpindle, being ſufficient for this. The end of the thread is merely lapped round the upper end of the ſpindle, and its accumulation upon itſelf ſoon forms a maſs G, which is called a cop, or coppin. Now it is evident that, from the inclined poſition of the ſpindle, it will, when turned round, give twiſt to that part of the thread which is between the end of the ſpindle and the roller A, although the ſpindle and the direction of the thread do not coincide, becauſe, when the ſpindle is turned, the thread will ſlip over the top end of it and receive a twiſt, without winding up upon the cop; but when it is required to wind up, the thread, or wire H, is preſſed down upon the thread. This removes it from the end of the ſpindle to the middle of the cop, as ſhewn in *fig.* 5, and then the motion winds up the thread upon the cop inſtead of twiſting it. The wire, H, is extended at the end of a lever H I, moveable on a centre I, in the manner ſhewn in *fig.* 5, but when left at liberty, the weight of the oppoſite end of the lever reſtores it to the poſition *fig.* 4, and then the ſpindle twiſts the thread inſtead of winding it up.

The operation of the machine is this: the rails E and F, ſupporting the ſpindle, are part of a carriage or frame carrying above 100 ſuch ſpindles, and moving on wheels which traverſe on railways to and from the rollers in a direct line, for the extent of a yard and a half. Now ſuppoſe it wheeled home, that the ends of the ſpindle are cloſe to the front roller A, then ſuppoſe the rollers ſet in motion, they take in the roving from the bobbin W, and draw it out or extend it eight or more times, giving it out between the front roller A, to the ſpindle G, which, with its carriage, recedes, by the movement of the machine, from the rollers, taking up the thread as faſt as it comes out between them; and, at the ſame time the machinery draws the ſpindle back, it turns it round rapidly, giving twiſt to the thread as faſt as the rollers deliver it out, and thus producing ſuch a compreſſion of the fibres by twiſting them round each other, as will form a thread of ſufficient ſtrength to bear *ſtretching*. This means, that when a yard of thread has been given out by the rollers their motion ceaſes, ſo that they deliver no more, but the ſpindle continues to recede from the rollers to the further diſtance of a yard and half, twiſting the thread all the time it ſtretches it out in length, till it forms a fair and ſtrong thread. The twiſting motion of the ſpindle then ſtops, as does alſo the drawing-out movement of the ſpindle, with its carriage. Thus one yard and a half of thread is made and finiſhed. The attendant to the machine now thruſts the ſpindle, with its carriage, home to the rollers, holding the wire H, done in the manner ſhewn in *fig.* 5, and at the ſame time turning round the ſpindle at ſuch a rate, that it will wind up the thread upon the coppin, and the wire H, which is held down by the hand, is ſo humoured, as to make the thread wind up with regularity. The rotatory motion given to the ſpindle is, in this inſtance, done by the other hand of the attendant, and is ſo accommodated, as to wind up the thread juſt as faſt as the advance of the ſpindle towards the rollers requires, and no more; but when it arrives cloſe to them, the wire, H, is raiſed up, and the machinery is put in motion again, the rollers begin to draw out, and the ſpindles to recede, turning all the time. The mechaniſm by which all this is effected is deſcribed by *figs.* 1. 2, and 3; firſt, ſee *fig.* 2, where K is a live and dead pulley for the endleſs ſtrap actuating the whole by the power of the mill. The pulley is mounted on a ſhort ſpindle, having a winch or handle, L, at one end, and on the other a large pulley M, which has a number of different-ſized grooves formed round it, to receive an endleſs rope *i*; ſee alſo *fig.* 2: this rope, after making a half turn round M, paſſes under a wheel *k*, fixed on a pin or ſtud projecting from the frame. From this wheel the rope, *i*, proceeds to another wheel, *l*, at the oppoſite end of the frame, and returning from this goes over a wheel ſituated cloſe behind *k* on the ſame centre pin. The ends of the rope are then joined, and it forms an endleſs band, which, when the ſtrap is caſt on the live pulley *k*, and the wheel, M, turned by it, the rope, *i*, conſtantly runs in a ſtraight line from the wheel *k* to *l*; but in this paſſage the rope makes a quarter turn round a wheel *m*, upon a vertical axis, which is mounted on the frame or carriage E F, for the ſpindles D, G, ſhewn ſeparately in *fig.* 1. The rope, *i*, not only paſſes round the wheel on this ſpindle, but goes forwards into the carriage, and paſſes round a groove upon the upper end of a vertical drum, (not ſeen in the figures,) which has ſeveral bands upon it, each driving two ſpindles, D, by paſſing round the pullies, *b*, of two of them, as ſhewn in *fig.* 3, in which it is alſo ſeen that the bands are all at different heights, that they may not interfere with each other upon the drum, but each take its proper place upon the length thereof. The carriage runs upon four wheels 1, 2, (*fig.* 2.) two of which are placed at each end, and run upon an iron railway, ſo that the carriage containing all the ſpindles and drums runs backwards and forwards, to and from the rollers, for the length of a yard and half. But during this motion, the power of the mill is all the time conveyed to turn the ſpindles by means of the endleſs cord *i*, which, as beforementioned, making a ſtraight line from the wheel *k* to *l*, will not be affected by the motion of the carriage, but will always circulate round the ſeveral wheels, and give motion to the drum which turns the ſpindles: 4, (*figs.* 1 and 2.) is an iron bracket, ſupporting the axis I I′ of the lever, H, *fig.* 4, which ſupports the wire H, and as many of theſe levers are fixed on the axis I, as ſhewn in *fig.* 3, as are ſuffi- cient

cient to make the wire H, ftiff enough to prefs down all the threads together, in the manner of *fig*. 5. The remaining parts of the carriage, being only its frame, are evident from *fig*. 1, and need no farther notice, except a double pulley; that is, a pulley 5, with two grooves upon it, fitted on a ftud or pin in the underfide of the frame, between the two wheels 1 and 2. The ufe of this pulley, with its ropes, as we fhall defcribe, is to make the whole carriage move parallel, or both ends equally, which, in a carriage of twenty feet long, requires fome nicety. As the two wheels 1 and 2 cannot be placed very diftant, and therefore give little fteadinefs to a carriage of fuch a great length, the parallelifm is thus preferved: a rope, 6, is made faft at one end to a fixed part of the framing, then paffes a quarter round the upper groove of the pulley 5, and runs along the whole length of the carriage, and turns a quarter round a fimilar pulley 7, *fig*. 3, and then goes forward parallel to its firft direction, from 6 to 5, and is made faft to the frame in a fimilar pofition to 8, *fig*. 2, but at the farther end of the frame. In the fame manner, another rope is faftened to the frame at 8 and making a quarter turn round the lower groove of the pulley 5, proceeds the whole length of the carriage, makes a quarter turn over the pulley 7, *fig*. 3, and proceeds parallel to the firft direction, from 8 to 5, and is made faft to the frame in a fimilar pofition to 6, but at the oppofite fide of the frame. The two ropes crofs each other in the centre of the carriage, and they always pafs over oppofite fides of the pullies 5 and 7. Their effect, which is not eafily explained without a feparate figure on purpofe, is to make the carriage move equally at both ends, for it muft do this, unlefs one or other of the ropes flip upon the grooves of their refpective pullies 5 or 7, and this they will not do if ftrained tight. We have clearly ftated the paffage of the two ropes 6 and 8, and the mechanic who knows this, will readily fee the manner of its operation, though it is difficult to explain it by words only.

We muft now attend to the wheel-work for the rollers: a bevilled wheel *o*, fixed clofe behind the wheel M, on the main axis, turns another on the end of an inclined axis *p*, *fig*. 2, at the oppofite end of which is another bevilled wheel, turning *q*. fixed on the extremity of the front roller; which being connected with the middle and back rollers by the fame wheel-work as the throftle frame, and the rollers being of a fimilar conftruction, demand no further defcription, except what we have already given in *fig*. 4, of the weights for preffing down the upper rollers. When the rollers are to be caft out of gear, it is done by difengaging the wheel, *p*, from the wheel *o*; for which purpofe the bearing for the upper end of the inclined axis carrying the former, is made in the upper end of a lever *r*, which moves on a centre pin, fixed in the ftandard fupporting the bearings for the axis of the wheel M: the lower end of this lever is connected with the end of a fhort lever *s*, moveable on a vertical centre pin fixed in the frame: this lever has an arm proceeding from the centre at right angles with that feen in *fig*. 2, and is therefore hidden behind the centre, its form being fhewn at Z, which is a plan of this lever. From this fecond arm a wire proceeds to the pendulous lever P *t v*, moveable on the centre pin *t*. Now by moving the end. P, of the lever, P *t*, away from the wheel, M, it draws the wire and arm of the lever *s*, the other arm of which acting upon the lower end of the lever *r*, to throw it inwards, throws the upper end outwards, and brings the wheel, *p*, in contact with the wheel *o*, fo that the inclined axis, and the front rollers alfo, are fet in motion, as long as the end of lever, P, is kept held towards the end of the frame. This holding is performed by its arm *v*, which, as in the figure, may be hooked under and kept down by a fmall catch *w*, and from this a fine wire, 9, proceeds back to the oppofite end of the frame, and is then linked to a fhort lever, which is fitted loofely on the fame centre pin which connects the lower end of the lever, *r*, with the arm of the lever *s*. This lever is fhewn at *z*, in the feparate figure Z, but its ufe is only to fupport the end of the wire 9, and keep it up, fo that a part of the carriage of fpindles, in running back, may, by intercepting the end of it, draw the wire and the catch *w*, thus relieving the arm, *v*, of the lever P, and this, as before explained, throws the wheel, *p*, out of gear, and the motion of the rollers ceafes. On the return of the carriage towards the rollers, a piece of wood, *x*, fixed to it, runs againft the lower end of P, and moves it back fo far that the catch, *w*, engages it. This fets the rollers in motion, which they continue, until, in the retreat of the carriage, a piece of iron *y*, *fig*. 1, projecting up from it, catches the fhort lever, *z*, near *s*, fupporting the wire 9, which being thus drawn, difengages the catch *w*, and then the wheel, *p*, is caft out of the gear with *o*, as before-mentioned, and ftops the motion of the rollers. The motion for drawing out the carriage from the rollers is thus performed: a cog-wheel R, which has a pulley fixed on againft it, receives an endlefs rope, 10, paffing round a pulley, 11, at the end of the frame. One part of the endlefs rope is tied to an iron arm projecting from the carriage, fo that when the wheel, R, is turned round, by engaging its teeth with a cog-wheel fixed upon the end of the front roller, the endlefs rope, 10, traverfes, and moves or draws the carriage out with it. The wheel R, which is called the Mendoza wheel, is made to lock in or out, by fitting it on a centre pin, which is faftened into the upper end of a lever T, (fee the feparate view,) moveable on a pin fixed in the frame. The lower end of this lever is moved by a horizontal lever, feen endways near V, which reprefents its vertical centre pin or ftud. The end of this lever, which is before the ftud, or neareft the eye, is connected by a ftrong wire with the lever P, and therefore, when this lever is pufhed by the motion of the carriage, it engages the Mendoza wheel, and draws out the carriage, at the fame time that the rollers are put in motion, and give out the roving between them; but the carriage, being drawn out to the length of roving which it is to have to ftretch and fpin the Mendoza wheel, is not difengaged the moment the rollers are caft out by the wire 9 and catch *w*, in the manner we have juft defcribed, becaufe the lever, T, carrying that wheel is provided with a catch, fimilar in its properties to *w*, that is, it holds the wheel, R, in its work until the carriage has run a yard and a half, and then it feizes a wire communicating with this catch, thus difengaging the catch holding up the lever T: the Mendoza wheel then falls back, and the drawing-out movement of the fpindles ceafes. This catch and wire are not fhewn in the figures, as it would produce much confufion, but being fo exactly fimilar in this action to the catch *w*, and its wire 9, they may be eafily imagined.

We have now to defcribe the manner in which the rotation of the fpindles is caft in and out. The reader, if not confufed by the complication of this machine, may remember that we explained the connection from the wheel M, by means of the endlefs cord *i*, to the wheel *m*, and thence to the vertical drum turning the fpindles. When this motion is to be thrown in and out, it is done by fhifting the main ftrap, driving the whole machine on the live or dead pulley K, *fig*. 3. The ftrap is guided by paffing through an eye or loop at the extremity of a lever, W Y, fixed on a vertical

vertical axis 12. On the lower end of this axis is a long lever 13, and at right angles to this a ſhorter lever, which being ſeen endways is not apparent, but it advances ſome diſtance forwards from the centre of the lever, and has a wire, 14, jointed to it, which is extended to a lever 15, againſt which the carriage runs when it is puſhed home, and the ſpindles are cloſe up to the front rollers. When this happens it draws the wire 14, which acting on the ſhort lever of the axis, 12, turns it round, and the lever Y W with it, ſhifting the main ſtrap from the dead to the live pulley K, and thus putting the whole machine in motion; at the ſame time that, by the operation we have before explained, the Mendoza wheel is thrown in, and alſo the movement of the rollers. The former of theſe draws back the carriage, till, as deſcribed, the catches are releaſed, and the movement, firſt of the rollers, and then of the Mendoza wheel, are thrown out. At the moment before this happens, the carriage intercepts the end of the lever 13, which is formed like an inclined plane: it is therefore thrown outwards by the carriage running againſt it, and the end of the lever, W, being at the ſame time moved, it ſhifts the ſtrap upon the dead pulley, and the motion of the whole machine ceaſes. The attendant to the machine now takes hold of the handle L, and puſhes the whole carriage back again, till the ſpindle comes cloſe home to the rollers; then by the carriage ſtriking the levers 15 and P, it ſhifts the ſtrap to the live pulley, and puts the ſpindles all in motion together, at the ſame time caſts, in the motion of the rollers, to give out the roving; and alſo it caſts in the Mendoza wheel, which traverſes back the carriage and all the ſpindles to take up the roving as faſt as it comes from the rollers, twiſting it by the motion of the ſpindles all the time.

To deſcribe the operation of this ingeniouſly conſtructed machine, will be only to recapitulate movements which we have repeated ſeveral times over; but this recapitulation will give the order in which they ſucceed each other. The man or woman who attends the mule ſtands in front of the ſpindles, at ſuch a diſtance from the right-hand end of the frame that he can conveniently reach the handle L. In the other hand he holds the axis, I, of the wire H. Suppoſe, to commence, that the ſpindles are cloſer to the rollers, then the movements ſucceed each other as follow:

1. The lever 15, being thruſt back by the carriage running againſt it, draws the wire 14, and by the lever, W, ſhifts the ſtrap upon the live pulley, putting the wheel M, and the wheels *k*, *l*, with the endleſs rope *i*, the wheel *m*, and all the ſpindles in motion.

2. The end of the lever, P, being preſſed by the carriage, engages the wheel for the motion of the rollers, and they begin to deliver out the roving at the ſame time.

3. The Mendoza wheel is caſt into gear, and begins to cauſe the carriage to retreat from the rollers as faſt as they give out the roving. Theſe firſt, ſecond, and third motions, all happen at the ſame inſtant.

4. The ſpinning of the rovings is now performed by the above motions, the ſpindles twiſting the rovings as faſt as they are given out; but the motion of the rollers is ſo quick, that the twiſt now given is ſlight, but having thus extended, or taken out, a yard in length from each ſpindle to the roller, the piece of iron *y*, *fig.* 1, on the carriage, meets the end of the lever *s*, and

5. Diſengages the wheel-work for the rollers, which are therefore ſtopped, and deliver out no more roving; but the retreat of the carriage and the twine of the ſpindles continues for another half yard, ſtretching out the thread, and twiſting it, till the piece of iron, *y*, meets the catch of the next wire, which is not drawn in the figure, and

6. Diſengages the Mendoza wheel, conſequently the carriage draws out no farther. The thread being ſufficiently extended and twiſted,

7. The carriage takes hold of the end of the lever 13, and thus ſhifts the ſtrap to the dead pulley K, *fig.* 3, and the motion of the whole machine ceaſes.

8. The attendant, by turning round the axis, I, of the wire H, preſſes down all the threads together from the points of the ſpindles to the middle of the coppin, in the manner of *fig.* 5; then

9. Takes hold of the winch L, to regulate the winding of the thread on the coppins, when he

10. Drives the carriage home to the rollers. In this motion the ſpindles all revolve, and lap up the thread upon the coppins. The revolution is cauſed by the endleſs rope *i*, which may, when the machine is ſtanding ſtill, be conſidered as a ſtationary rope acting upon the wheel *m*, and the drum for the ſpindles, and as their centres traverſe, turning them all round, on the ſame principle as a carriage wheel is turned by rolling on the ſtationary road. In like manner *m* is turned, by moving along while the rope, *i*, is immoveable. Now the quantity of motion, or the number of revolutions the ſpindles will make during this return of the carriage, is, in all caſes, the ſame, and the quantity of thread to be wound up is always the ſame; but it is evident that it will require a greater number of revolutions to wind up the length ($1\frac{1}{2}$ yard) of thread, when winding upon the ſpindle, or upon the circumference of a ſmall coppin, than when the ſame coppin is increaſed by the accumulated thread to ten or fifteen times the ſize of the ſpindle. To accommodate this, it is neceſſary for the ſpinner to have the handle, L, in his hand, becauſe he can, by turning this one way or the other, add or diminiſh ſo much to the number of turns the ſpindle will make, as will juſt take up the thread as faſt as the carriage advances towards the rollers. Thus, at firſt beginning, when the coppins are ſmall, the handle, L, will require to be turned forwards a conſiderable quantity, to make them wind up the thread ſufficiently faſt: but as the ſize of the coppins increaſe, they will come to ſuch a diameter, that the handle requires to be held quite ſtill. The motion given to the ſpindles by the return of the carriage, being then juſt equal to wind up the thread at the proper rate, any increaſe of the dimenſions of the coppins after this will require the handle, L, to be turned backwards, to diminiſh the motion of the ſpindles, or they would wind up too faſt, and break the threads.

The ſpinner accommodates the motion of the handle, L, ſo exactly by habit, as to keep the threads always to that degree of tenſion as will make the coppin compact, but not injure the thread; at the ſame time by the other hand, which holds the ſpindle of the wire H, he lays the thread regularly on the length of the cop.

The carriage, having with theſe precautions been wheeled up cloſe to the rollers, the ſeveral operations are repeated as before; and thus the mule continues to ſpin a yard and a half upon each ſpindle every time it is drawn out, and then wind it up on the ſeveral coppins. A good ſpinner will draw out 3000 times *per* day of a mule with 240 ſpindles; and many women will attend two machines, having them placed oppoſite to each other; and while one is drawing out ſhe will thruſt home the other. This makes 108,000 yards *per* day upon each mule, or both together will make more than 1200 miles to be ſpun in one day by one woman; who, on the old method of the hand-wheel ſpinning, on which the mule is an improvement, would only have managed a ſingle ſpindle, inſtead of 480; and this ſingle ſpindle would not have ſpun half the quantity of any one in the mules; and with

with refpect to the regularity and accuracy of the thread no comparifon can be drawn. A mule of 240 fpindles has nine drums in the carriage to turn them; all the length, therefore, is nine repetitions of *fig.* 3, which only contains the fpindles turned by one drum.

The motion of the mule can at any time be ftopped, if a thread break, or any other accident happens, by means of a long wooden rail, Y, which is joined to the end of the lever W Y, and extends along over the whole length of the rollers, fo as to give the fpinner the means of ftopping the mule when ftanding oppofite to any part of its length; for it is evident, that by thrufting this rod one way or the other, the ftrap will be fhifted either on the live or the dead pulley, ftopping or putting the wheels in motion at pleafure.

The thread fpun upon the mule is much fofter, and has a fmoother furface than the water-twift: this is owing to the manner in which the extenfion of the thread is made, after it has been twifted flightly, and the fibres thereby compreffed together in fome degree; for the effect of ftretching a flightly twifted thread is, to draw all the ends of the fibres into it. All thefe fibres having affumed a fpirally curved form in the thread, by drawing or ftretching them out in the length of the thread one among another, thefe fibres are drawn along with a fpiral movement, and all their ends are thus brought into, and concealed in the body of the thread. This operation, at the fame time it makes the furface of the thread even and fmooth from projecting fibres, increafes the ftrength of the thread by bringing them all into ufe; and the ftrength obtained by this means does not require the thread to be twifted hard, but leaves it foft and pliable, which is the great recommendation of the mule-twift.

The thread thus fpun, either by the water-frame or mule, has many other operations to go through to prepare it for the market, where it is to be fold to the weaver or manufacturer. The chief end of thefe operations is, meafuring it out in lengths, weighing it to afcertain the number, and packing it up for carriage. The firft machine the thread is taken to after fpinning is

The Reel; fee *figs.* 1 and 2 of *Plate* XII. The former being an elevation of the end, and the other an elevation in front, a very fhort explanation of this machine will fuffice; its framing and fome other parts being evident. A A is a row of the bobbins of the fpinning frame, or for mule-twift, the coppins of the mule ftuck upon pins, on which they will revolve freely and give off their thread. B, *fig.* 1, is another row placed behind the former, and arranged in the intermediate fpaces between the bobbins of the firft row, which arrangement is neceffary, becaufe the bobbins would touch each other if all placed fide by fide. The threads for thefe bobbins are conducted between feveral pins or wires, ftuck up in a rail of wood D, and each thread is twifted once round one of thefe pins, that it may be drawn off with fuch a degree of force, from the friction thus occafioned, as will caufe the thread to lap or wind with a fufficient tenfion upon the reel E E, which confifts of a horizontal fhaft E, from which three fets of arms, F, proceed, fupporting fix rails, G, G, parallel to the axis, and upon thefe the thread is wound, as fhewn in the figures at *r*. The dimenfions of the reel is fuch, that it takes exactly a yard and a half of thread to make one turn round it: this, therefore, is the meafure of length, and the mechanifm which remains to be defcribed is for the purpofe of counting the number of revolutions it has made. The reel is turned round by means of a cog-wheel, H, on the end of the fpindle: this is turned round by a wheel K, on the axis of which is a pulley M, to receive an endlefs rope, which is turned round by the mill; but the bearing for the pivot of the axis, E, is fitted in a groove, formed on the top rail of the frame, fo that the wheel, H, may, by fliding the bearing in this groove, be difengaged from the teeth of the wheel K, and then the movement being thrown out of gear, the reel ftops. On the oppofite end of the axis of the reel, a pinion, *a*, of 14 teeth is fixed, which turns a bevilled wheel of 28 teeth on the upper end of a vertical axis *b*, which has an endlefs fcrew upon it, turning a wheel, *d*, *fig.* 1, of 40 teeth, on the axis of which is a pinion of eight leaves, turning a wheel, *e*, of 56 teeth. This wheel has a fmall circular ring fixed on the face of it, which is formed like a fnail on the front edge, that is, its furface is not parallel to the plane of the wheel, but is inclined to it in fuch an angle, that in turning round it operates upon a lever, *f*, to move it backwards and forwards, and this motion is, by means of a vertical lever, *h h*, communicated to the rails, A B and D, at the top of the reel, which carry the bobbins, and alfo the pins, D, that guide the thread, and having thus a fhort traverfe motion parallel to the axis of the reel, the threads are laid regularly by the fide of each other, without overlaying each other in one place, as they would do without this motion, and by thus enlarging the diameter of the reel, the thread that winds upon the meafure would be incorrect.

By calculating the numbers of the train of wheel-work, *a*, *b*, *d*, &c. which we have before explained, *viz.* by multiplying the number of all the pinions together, and the number of all the wheels together, and dividing one fum by the other, thus, $14 \times 1 \times 8 = 112$, the product of all the pinions: again, $28 \times 40 \times 56 = 62{,}720$, the product of the wheels. Divide 62,720 by 112, and the refult is 560; therefore the wheel *e*, of 56 teeth, will make one turn for 560 turns, or bouts of the reel. The wheel *d* makes only one-feventh of this number, or once for 80 bouts; and a pin being fixed in the back of its rim, feizes the tail of a bell, *m*, once for every turn it makes, confequently this bell rings at every 80 bouts of a yard and a half each, = 120 yards of thread wound upon the reel. The reeler, in beginning, makes the end of each thread faft to one of the rails, G, of the reel, then cafts it on, and fets it going until the bell, *m*, rings; it will then have made 80 bouts, or reeled 120 yards, which is called a ley. The reel is ftopped the inftant the bell rings, and every one of the leys of thread, *r*, *r*, *fig.* 2, is tied up by a piece of thread to keep thefe 80 bouts diftinct; then the reel is fet on again and another ley reeled, which is tied in its turn; and when feven leys have been thus done, it makes 560 bouts, or 840 yards, which length is called a hank: the feven leys compofing it are tied all together, the ends of the thread cut off, and the hanks are removed from the reel. They are got off by what is called ftriking the reel, to do which, the arms fupporting one of the rails, G, are divided acrofs in the middle of each, and united by hinges. When the arms are fet ftraight, and kept fo by a fmall bolt, the reel is of the true dimenfions; but by withdrawing the bolt, and bending the arms on the hinges, the rail falls in towards the centre, and the reel is fo diminifhed in fize, that the hanks hang flack upon it, and can eafily be flipped off at the end of the reel, which is lifted off its bearings for that purpofe.

A reel ufually winds 50 bobbins at once, and the principal care of the attendant is to watch the bobbins, fupplying others, and tying the ends of the threads as faft as they are exhaufted.

The hanks are now twifted up into a knot, by catching one end of them over an iron hook fixed to the wall, then putting a fmall iron rod in the other end, the hank is twifted up very hard, ufing the rod as a lever to turn it round. To prevent its untwifting again, it is taken by the middle of its length, and without fuffering the ends to entwine it is doubled, then the ends are releafed, and the two halves twift over each other, forming a bundle or knot of thread, refembling a piece of thick rope, about eight or nine inches in length, and perhaps two inches girt. The hanks, being thus all knotted, are weighed, to afcertain their number. The weighing inftrument confifts of a fhort pendulum, from which an arm proceeds on each fide, at top paffing through the centre of fufpenfion, fo that it refembles the letter T. From one of the horizontal arms a hook is fufpended, by which the hank is hung on; and at the end of the other arm is an index pointing to an arch which is divided, and has figures upon it, fhewing how many of fuch hanks (as the index is brought to by hanging any one upon the hook) will weigh a pound. The divifions are made by experiment, and frequently verified by means of fmall leaden weights, which the overfeer is provided with.

As faft as the number of the feveral hanks is determined by this index, they are thrown into different bins or fhelves, and when they are to be made up for market, as many hanks of any number as will weigh ten pounds are counted out, weighed, as a check upon the weighing inftrument, and packed up in paper, forming a fmall fquare bundle, which is made compact and tight in the bundling-prefs. This is a fmall fquare cheft, of about eight and a half inches by nine and a half, formed of vertical iron bars fet upon a table, and a lid of iron bars fhuts down over the top, with bolts or other faftenings. The bottom of the cheft is moveable up and down by means of a rack and pinion, a fcrew or other means, which will enable the workman to give a great preffure upwards. The hanks are packed clofely into this cheft with paper round them, and the whole number being packed in, the lid is fhut down and bolted upon them; then by turning a handle the bottom of the prefs is raifed up, and compreffes the bundle together into as fmall a compafs as is required. The bundle in this ftate is tied round with feveral ftrings, the interftices between the iron bars compofing the prefs leaving fufficient room for the admiffion of fuch ftrings, and for the knots to be tied to confine the bundle. In thefe bundles the greateft portion of the twift is fent to market; but what is called hard twift, muft be twifted two threads together, as is alfo ftocking-yarn. Such thread as is intended to be doubled for thefe purpofes, is taken from the fpinning-frame to the

Doubling machine, inftead of the reel. Here the threads, two together, are wound upon bobbins, as preparatory to twifting them round each other. See *Plate* XIII., *figs.* 1 and 2, which reprefent a doubling mill; in front *fig.* 1, and endways at *fig.* 2. A is the pulley which is turned round by the mill: this pulley is loofe on its fpindle, but has a clutch or locking-box at the back which connects it with its fpindle, when the upper end of the lever, B, is moved towards the machine. But when it is moved the other way the machine ftands ftill, though the pulley continues all the time to turn round. A wedge, *a*, being put on either fide of the lever in its mortife through the piece of wood D, retains the pulley, A, either unlocked or locked in gear, with the fpindle which is fixed in the end of a throftle-cylinder, R, and by bands turns all the fpindles, *b*, *b*, together. The bobbins of the fpinning-frame are ftuck upon pins in the top rail, E, of the frame, and the threads defcend to wires, *d*, round which they make a turn, two threads in company, to produce a friction, as before explained, fufficient to lay the turns on the bobbin of the fpindles, *b*, *b*, tight and even. The threads then go through wire ftaples or eyes fixed in a rail, F, fituated oppofite to the bobbins *c*, *c*, which are ftuck faft on the upper ends of the fpindles *b*, *b*, and being turned thereby, wind up the thread from the bobbins at E: the rail, F, is adapted to rife and fall parallel to itfelf, being attached by radial bars to an axis moving on centre pins fixed in the frame. Its motion is occafioned by an iron rod, *f*, which is jointed to it, and connects it to a lever, *g*, fixed on an axis; and at the extreme end of this is a lever, *h*, *fig.* 2, refting upon the circumference of a heart, *k*, fixed on the face of a cog-wheel *i*. This is turned by a pinion fixed againft a wheel *l*, which receives its motion from another pinion upon the end of the fpindle of the throftle cylinder R. By this train of wheelwork the heart is flowly turned round, and raifes and falls the lever, *h*, at the fame time giving a fimilar motion to the rail F, and by that means regularly winding the thread upon the bobbins *c*, *c*, which are turned rapidly round by the motion of the vertical fpindles *b*, *b*, which receive their motion from the throftle cylinder, R, by the bands, as before defcribed. The bobbins are fuch as fhewn feparate at X, and have a hole through them exactly fitting the conical end of the fpindle, on which it fticks fo faft, that the bobbin will, by the motion of the fpindle, wind up the two threads together off the bobbins at E. When the bobbins are filled with double thread, they are removed to the twifting-machine, if it is intended to make ftocking-yarn, or if it is to be what is called hard twift, for fewing, knitting, or mending-cotton, it is done in the water-frame, which, however, undergoes fome alterations, *viz.* the fpindles are made to turn about in a contrary direction to that in which they moved to fpin the thread It is done by turning the whole frame the other way about, but as this would make the rollers move the wrong way, the pinion at the upper end of the fpindle of the binder is placed at the outfide inftead of the infide of the face-wheel on the end of the front roller. The rollers then turn the right way about to deliver the thread to the fpindle, but the back and middle rollers are removed, as it is not required to draw out the thread, the rollers being merely wanted to hold the threads faft whilft they are twifted one about the other, and to deliver it regularly to the fpindle, which operates in the fame manner as for the firft fpinning, except that it twifts in the contrary direction; becaufe when any two threads are to be turned together, it muft be done by a contrary twift to that which compofed the two feparate threads themfelves. After fpinning this hard twift it goes to the reel, and is treated in all refpects as other twift is. When it is merely required to twine the two threads flightly together for ftocking-yarn, the bobbins of the doubling-machine, when filled with double threads, are carried away to

The twifting-machine, fee *Plate* XIII., *fig.* 3. of which is an elevation endways; and *fig.* 4, another elevation taken in front. In this, A reprefents the live and dead pulies turning the whole machine: the ftrap is conducted through an eye at the end of an iron branch *a*, affixed to a rod or beam B, which flides in guides beneath the machine, and can be moved endways by means of a lever *b*, which comes out in the middle of the length of the machine, and the attendant, by applying his foot to this lever, and moving it fideways, fhifts the beam B, and the eye at the end of the branch, *a*, guides the ftrap upon the dead pulley: the machine then ftands ftill. The live and dead pulley is fitted on the end of the fpindle of the throftle cylinder D, which, by bands going to both fides, turns a double row of vertical fpindles on each fide, E *e* and F *f*, the internal row on either fide being placed oppofite the fpaces between the outer row, fo that the

the ſpindles are not crowded too cloſe together. On theſe ſpindles the bobbins are ſtuck in the ſame manner as thoſe of the doubling-mill; and the threads proceeding from the bobbins are conducted through wire eyes, which are fixed in rails, G, of the framing, then each twiſted thread makes a turn round a wire fixed in the rails, H, juſt above G, and theſe have a ſlight traverſe motion backwards and forwards, by which they lay the thread evenly upon the reels, I, K, which take up the threads, as before deſcribed, of the reeling-machine. The reels are ſlowly turned round by a train of wheel-work from the main ſpindle of the pulley A. This train conſiſts, firſt, of a pair of bevilled wheels, one on the main axis, and the other at the lower end of a vertical ſpindle L, which at the upper end has a pinion actuating another wheel, *g*, upon the middle of a horizontal axis, which at each end carries a pinion, turning wheels, M, N, on the ends of the pivots of the two reels. The proportions of the wheels are ſuch, that the reel turns once for about 24 turns of the main throſtle D, or about one for every 72 revolutions of the ſpindles, and as the reel is a yard and a half about, the thread will be twiſted about 72 times in that length by the rotation of the bobbin and the thread with it. The motion of the reel draws the thread off the bobbin as faſt as above-mentioned, ſo that the proportion of the wheel-work determines the quantity of twiſt which ſhall be given in any certain length. The reels are provided with counting wheel-work of the ſame operation as that before explained in the reeling-machine. Thus, on the end of the ſpindle of the reel is a pinion turning a wheel *i*, on the axis of which is a ſcrew turning a wheel *k*, and this has a pinion on it turning a wheel, *m*, by means of the intermediate wheel *l*. The ſpindle of this latter wheel has a nail fixed upon it, which operates upon a lever *n*, the lower end of which preſſes againſt a croſs-bar, connecting the rail, H, with its fellow. On the oppoſite ſide of the machine there is another ſimilar croſs-bar at the other end, and the two rails being thus united, form a frame which is ſupported on iron radial bars *p*, *p*, which move upon centre pins fixed in the rail, G, of the frame; ſo that the frame, with the rails H, H, has a free motion to traverſe without friction, and guide the threads to lay regularly upon the reels I, K. At the oppoſite end of the frame a ſtring is tied which paſſes over a pulley, and has a weight, *r*, ſuſpended from it, which always draws the frame one way, and tends to keep the upper end of the lever, *n*, in contact with the ſnail upon the axis of the wheel *m*. This axis has alſo a pin projecting from it, which every time the ſpindle turns round, rings the bell P. The motion of the wheel-work is ſo calculated, that the bell ſhall ring once for every 280 bouts of the reel, and the ſize thereof is ſuch, that this 280 bouts ſhall meaſure 420 yards, being the length of the double thread hank, *r*, equal to half the length of the ſingle thread hank, which is, as before mentioned, 840 yards, and the number of double thread yarn, is according to the number of theſe hanks of 420 yards each to the pound. The reels, I, K, when filled, are ſtruck, and the hanks taken off them in the ſame manner as the reeling-machine before deſcribed.

Hard twiſt, which is intended for ſewing, knitting, or mending-cotton, after being twiſted and reeled in hanks, is ſent to the bleach-field, and bleached by ſome of the proceſſes deſcribed in our article Bleaching.

But the proceſs which is moſt generally in uſe for bleaching yarn, is thus conducted: an earthen-ware retort is filled with one quart of oil of vitriol, two quarts of ſea-ſalt, and one quart of the ore of mangoneſe. The hood of the retort being put on and luted, it is ſet over a ſmall ſtove or ſand-bath, and the heat ſoon raiſes from it the oxygenated muriatic acid gas, which is received in a ſquare wooden cheſt, about ſeven or eight feet ſquare, and as many deep, forming a ſmall air-tight chamber, in the upper part of which the goods are ſuſpended upon a rack or frame. The lower part of the cheſt, for about three feet deep, is filled with water, ſometimes impregnated with a ley of potaſh, and ſometimes with lime-water, or water mixed with lime. The gas is introduced betwixt the fluid and the goods, amongſt which it aſcends, and by its action upon any colour they may contain, renders them white: at the ſame time, by occaſionally immerſing the goods in the fluid below, it is ſought to modify the action of the acid, and prevent the operation proceeding too rapidly. This is effected by means of a pole or long rod connected with the frame on which the goods are ſuſpended, the centre of which pole moves on a ſwivel fixed in a hole in the partition, or lid of the chamber, which is occaſionally ſtopped with clay, and enables a perſon to raiſe the goods by means of a ſmall crane, or, at pleaſure, to let them down into the fluid, not always, however, without inconvenience, which occaſioned it the name of the *Bedlam proceſs*, as the workmen, if they inhale the gas, are ſtupified.

Previouſly to the yarn being ſubjected to the action of the gas, it is boiled in a ley of pearl-aſhes, then milled for twenty minutes in a fulling mill, and the hanks are hung upon the racks or croſs rails of the ſquare frame in which they are ſuſpended, to be let down into the bleaching-chamber. This frame is, as before-mentioned, attached to a long pole, that ſuſpends it from the crane, which being ſwung over the chamber, is let down therein, and the lid is cloſed over it, the joints being made tight with clay, and the pole coming through a hole in the lid, which is carefully made tight round it by a wet cloth. The gas is now admitted to the chamber, but the yarn is not ſubjected to its action more than ten minutes before it is let down and immerſed into the liquor at the bottom of it, which thus defends it from the action of the gas for a few minutes, until it becomes thoroughly wetted, when it is drawn up again into the gas, and remains in it for half an hour to be bleached: it is then let down again, for a few minutes, into the liquor to wet it; it is then drawn up again, and in this manner the proceſs continues, until ſuch time as it is known, by experience, that the yarn will be ſufficiently bleached. The frame is drawn up by the crane, and the cotton removed from the rails on which it hangs, and being rinſed in clean water, is carried out and ſpread on the graſs in the fields, to be ſubjected to the ſun and air, by which the bleaching is completed. It is not the buſineſs of the preſent article to enter into the theory or chemical principles of this proceſs, which will be found under the article Bleaching.

After the hanks are returned bleached, the yarn is found to be much lighter, ſo that it will generally be two numbers higher: thus, cotton of N 48 hanks to the pound being ſent to bleach, will return ſo much diminiſhed in weight, as to require 50 of the hanks to weigh a pound. But this rule is not ſo exact as is requiſite; the thread muſt therefore be reeled over again, weighed, and packed. A great proportion of the ſewing cotton is wound into balls of a very beautiful appearance by a curious winding machine. As a preparation to this winding, the thread muſt be wound off the hanks in which it was bleached to large bobbins. This is done in a machine provided with ſeveral ſpindles, like the doubling machine, upon which bobbins are ſtuck, and the thread wound on them from the hanks, when they are extended or ſtretched out between two pul-

 lies,

lles, or fmall reels, on which the hank revolves in the manner of an endlefs band. Thefe bobbins are taken to the

Ball Winding Machine, fee *figs*. 3. and 4. of *Plate* XII. the former being a plan of the acting parts, and the latter an elevation of the whole machine on a fmaller fcale. In *fig*. 4. A is the bobbin from the winding machine, which is fluck upon a pin projecting upwards from the bench, and a fmall lead weight is laid upon the top of the bobbin, to load it, and caufe fuch a friction as will make the thread wind with a proper tenfion upon the ball. The principal part of the machine is a fpindle B, which is perforated through its length, and receives the thread: it runs, in bearings, at the top of two flandards *a*, *b*, and at the extreme end of the fpindle, beyond the front flandard, a flyer or branch, D, is fixed, and the end, *d*, of it therefore deferibes a circle when the fpindle, B, turns round by the endlefs band which furrounds the pulley E, and gives it motion from the mill. The fpindle has an endlefs fcrew cut upon it, turning a wheel, G, at the upper end of the vertical fpindle F, which, at the lower end, has an univerfal joint, *e*, connecting it with an inclined fpindle H: this, at the lower end, has a fmall bevilled wheel, *h*, turning another, *f*, on a fmall vertical axis, carrying, at the upper end, an univerfal joint, which communicates motion to an inclined fpindle I, and this, by another fimilar joint at *i*, connects with a vertical axis *r*, which has a pinion, *k*, turning a wheel *l*, upon whofe fpindle, *m*, the thread is lapped to form the ball, as fhewn in *fig*. 3: the fpindle, *m*, is fupported by a piece of metal, K, formed like the letter L, and moveable on a centre pin *n*, which is fituated exactly in a line with the fhort vertical axis of the wheel *f*: M is a circular plate, on which the piece, K, refts, when turned about on its centre pin *n*, and N is the handle by which it is turned about at pleafure upon it. The two fpindles, B and *m*, are, as fhewn in *fig*. 4, on the fame level, but are capable, as fhewn in *fig*. 3, of being fet at any angle to each other by inclining *m* on its centre pin *n*, and this being in the line of the fpindle of *f*, the motion does not tend to lengthen or fhorten the fpindles I and *r*; but they always cunvey the motion, communicated from the fpindle, B, by means of the axes F H I and *r*, to *m*, by the feveral wheels G, *h*, *f*, *k*, and *l*, which have been defcribed: they are fo apportioned, that the fpindle, *m*, turns only once for 48, 60, or 72 revolutions of the fpindle B. Thefe different numbers are ufed in different machines, and the appearance of the ball they will wind materially depends upon this circumflance.

To explain its operation, fuppofe the fpindle, *m*, inclined to B, as in *fig*. 3, the rapid motion of the fpindle, and its flyer D, (over the point, *d*, of which the thread is conducted) laps the thread round the fpindle, *m*, in an oblique direction. At firft, the ball thus formed has no regular figure, but as the thread accumulates and forms a cone, the lapping of the thread in a regular order begins and continues, as in *fig*. 3; here it is feen, that the motion of the flyer will lap the thread obliquely upon the ball from one end to the other, as the figure fhews; but at every fucceeding revolution of the flyer, the ball itfelf has made $\frac{1}{48}$, $\frac{1}{60}$, $\frac{1}{72}$, part of a revolution upon its own axis *m*, according to the proportion of the wheel-work, and thus the thread is not always difpofed on the fame oblique line, but on another parallel to it, and removed a fmall diftance from the former. Now it is plain, that the thread on the underfide of the ball muft be inclined in a contrary direction to that lapped on the upper fide; therefore, when the ball is looked at, the oblique threads of every alternate layer crofs each other, in the manner of the figure. This will, however, be much more readily underflood from an infpection of a ball of this kind, than from any verbal defcription. The length of the ball depends upon the angle which the fpindle, *m*, makes with the fpindle B; it can, therefore, by fhifting the handle N, be wound off of any required figure; but the moft general method is, when about one half the fize of the ball is wound, to give the fpindle a greater degree of obliquity: this occafions the ball to wind longer from that period, as well as a greater diameter: the confequence is, that when the ball is finifhed, on looking at the end of it a circular hollow is feen in it, as though it had been turned in a lathe, and fometimes a thin membrane, confifting of about two or three layers of thread, is extended nearly acrofs the end, leaving the hollow beneath, which can be feen into from a fmall hole in the end. This membrane is made by fetting the handle, N, at the greateft angle it will make, the thread then not only lays over the whole furface of the ball, but is ftretched partly acrofs the end of it; and the interfection of a great number of thefe forms a tranfparent membrane, which has a circular hole in the centre. After laying this layer two or three times over, the handle, N, is returned to its original angle, and winds the ball as at firft.

The bench or table RR, on which the machine ftands, is made long enough to contain fourteen fpindles, all placed in one row; and a throftle cylinder, running along under the bench, gives motion to them all at once. Two children attend the whole fourteen, which they can readily do, having only to lap the thread, at the beginning, upon the fpindle *m*, and then, when the ball has arrived at a certain fize, to turn the handle N; but the period or quantity of this alteration is not of any great importance, as it only influences the figure of the ball, and, as we before defcribed, thofe fancy ornaments within the hollow end: thefe may, by great attention in frequently and artfully fhifting the handle N, be made very delicate and beautiful. The machine we have juft defcribed was made after a model of a machine invented by Mr. Brunell, who firft devifed the means of connecting the fpindles, B and *m*, by wheel-work. The machines, before this, were turned by endlefs bands, from the principal cylinder which gave motion to the whole. The defect of this method was, that the relative diameters of the wheels could not be fo exactly proportioned, as to produce one turn of *m* for exactly forty-eight, &c. of B; that the threads of the fucceffive layers would lay exactly one over the other, becaufe the leaft variation in this refpect would greatly injure the effect of the ball. But in the machine before us, the motions are fo accurate, that, on infpecting the ball, it appears honey-combed, or confifting of regular cells, which gradually diminifh in fize as they approach the centre: the partitions between thefe cells are only one thread in thicknefs, but confifting of a great number, ftretched fo exactly over each other, that they form regular plane fides to the interior of the feveral cells.

We have now prefented our readers with all the operations of cotton-fpinning; but thefe operations are conducted on fo grand a fcale by many manufacturers, that the fyftem of their management, the arrangement of the buildings, the conftruction of their water-wheels, fteam-engines, or other firft movers, and many other particulars, are no lefs admirable, and worthy of defcription, than the machines themfelves. To defcribe all thefe curiofities of the cotton trade would fill a volume; but we muft content ourfelves with defcribing one plate, which contains drawings of one of the moft complete cotton-mills we have ever vifited. It is one of the four mills at Belper, in Derbyfhire, belonging to Meffrs. Strutts, whofe very extenfive works contain almoft every improvement in the cotton trade. The whole of thefe these mills is built fire-proof, being without any timber beams in the floors, or much wood work of large size in any of the machines, which makes them very secure from danger by fire.

Fig. 1. of *Plate* XIV. is a longitudinal section of the whole mill, shewing all the floors, and all the machines upon them, at one view. *Fig.* 2. is a section, across the length of the former; and *fig.* 3. is a similar cross section of the mill, and, at the same time, a longitudinal section of the wing, which extends from the centre of the mill, at right angles, to its length; so that the plan of the mill is of the figure of the letter T. We will first explain the manner of building fire-proof mills without timber, which has been adopted by Messrs. Strutts in their very extensive works.

The side walls A A, B B, and the end walls C C, D D, are built up as usual, and with the usual doors and windows in them; the several floors, E, F, G, H, I, K, are composed of brick arches, as shewn in the figures. In *fig.* 1, these arches are shewn cut across the span; and in *fig.* 2, they are shewn cut through the crown, parallel to the axis. These arches have a very small rise, and their span is nine feet from one to the next. The abutments, or springings of the arches, are supported by iron columns, *a*, *a*, as shewn in the figures, which are erected, one upon another, in the several floors, through the whole height of the mill. They are connected by cast-iron beams or girders, *b*, *b*, shewn in *fig.* 2, one of which extends from the top of every column to the next, and forms a support or springing for the arches. In an opposite direction to these girders, every pair of the columns, *a*, *a*, are tied together, across the arch, by a wrought iron bar, which has an eye at each end, to be hooked over the tops of the columns, and keep them tied together, resisting the lateral thrust of the arch, and preventing the columns from being thrust asunder from each other, as they would otherwise be. Thus, though every floor is formed of a system of arches, like a bridge, as shewn in *fig.* 1, yet the lateral strain of each is supported by iron tyes; so that each arch stands by its own supports, independent of its neighbours. The arches are of only one brick thickness, and are covered over at top by a floor of paving bricks, to make a flat surface above, the haunches of the arches being filled up by rubbish. The iron tyes across the arches are concealed within the brick-work of the arch, so that they do not appear; the ceilings of the rooms, therefore, consist of regular arches, which have a very good appearance, and make the most firm and solid floors above that can be imagined. The roof is of cast-iron, as shewn in *fig.* 2, where the two columns, *d*, *d*, are a continuation of the columns, *a*, *a*, in the lower floors; and a cross or girder beam, *e*, which connects them, is also a support of the cast-iron principals, *f*, *f*, of the roof; and *g*, *g*, are further stays, proceeding from the iron girders uniting the columns of the ceiling, *k*, beneath: the space between the two columns, *d*, *d*, in the roof, forms a small room, which is used as a school-room for the work-people on Sundays. The desks and forms are shewn in the figure.

The mill contains fifteen arches in length, as shewn in *fig.* 1, between the walls C C, D D, which are the end walls of the mills. Besides these is another wall, L, to which the floors are continued by two additional arches, added beyond the end wall, C, of the mill. This space forms a small room on each floor, which is occupied by the counting-house, stair-case, and the stove, which warms the mill in winter; and also a crane of a peculiar construction, for drawing up the goods to the machines on the several floors.

The space of the mill, therefore, between the walls C and D, is appropriated to the machinery, as is also the wing, which consists of six arches, as shewn in *fig.* 3, projecting from the middle of the mill, perpendicular to its length.

The width both of the mill and the wing is, as shewn in *fig.* 3, composed of three lengths of arches, having three iron girders that they rise from, and two columns to support them. The arches in the ground-floor, or cave of the mill, are supported by very strong piers, *m*, instead of iron columns. These piers are founded very firmly in the earth, and every caution taken to prevent them subsiding, or settling under the great weight they have to carry. The columns of the first floor are erected immediately upon the top of these piers: on the top of these columns are those for the second floor; the third surmount these, and so on to the top of the mill: the columns being thus erected, one upon another for the whole height of the mill, forms the staunchest building that can be imagined.

We shall now proceed to describe the machinery of the mill. The whole motion is taken from the great water-wheel M, situated underneath the wing, in the cave, or lowest room of the mill; and as it is of so great a size, namely, 18 feet diameter, and 23 feet long, that no cast-iron girder could be thrown across it strong enough to support the arches for the wing above it, a strong stone arch, N, is thrown across from the wall *h*, which is built up at one end of the water-wheel, to the wall, A, of the mill, which is at the other end of the mill; and to resist the thrust of this arch, two strong iron bolts, *x*, are extended across it, and render it as strong as possible; so that the iron columns of the wing over it may be raised upon it as safely as they could upon foundation piers, *m*, like the others. But as a precaution against overloading the walls, *h* and A, which, as they include the water-wheel, would ruin every thing, if they settled in the least, the arches of the wing immediately over the water-wheel are built, instead of solid brick, with small pots like garden pots, so that they are light, but sufficiently strong to bear any thing which is ever required to be loaded upon them. These small pots are also used to build the arched floor, K, of the roof, that it may be light, and as it has nothing to bear but the school room, they are sufficiently strong to make the floor.

The great water-wheel has a cog-wheel, *o*, upon the end of its shaft, which turns a pinion, *p*, on a strong shaft, that carries a wheel *q*, and thus turns a pinion on a third shaft, *r*: this, at the end, has a bevilled wheel, which gives motion to a vertical shaft, *s*, proceeding up to the top of the mill, and turning the machinery in the several floors. The bevilled wheel on the shaft, *r*, also drives a horizontal shaft, *t*, extending the whole length of the mill, and having upon it, just beneath every arch, a bevilled wheel, turning another on a vertical spindle, which rises up through the two floors D and G. These are the main spindles of the spinning frames, and the great frames are fixed upon them. The frames are all shewn endways in *fig.* 1; but in *fig.* 3, on the floor F, a pair of frames are shewn in front, as they stand side by side, and the floor, G, over it has just the same, as has also the wing, though not put in the drawing; but these last are turned by a bevilled wheel, *v*, *fig.* 1. on the shaft *s*, in the floor G, which turns a horizontal shaft, *v*, *fig.* 3, extending the whole length of the wing, and turning the spindles of the several frames as it passes over them. The two lowest floors, F, G, which are appropriated to the spinning frames, contain 28 frames on each floor, 56 and 12 more in the two floors of the wing, in all containing 4236 spindles, a considerable proportion of which are, however, employed in spinning the hard twist. The two next floors, *viz.* the

the 3d, H, and the 4th, I, are occupied in the body of the mill with carding machines, which ſtand in three rows: they are turned by ſtraps from a horizontal ſhaft, extending the whole length of the mill, over the machines. In *fig.* 1. they are ſhewn endways, and *fig.* 3. ſhews them in front of the floor H, while that above it is juſt the ſame, though not drawn: in all theſe two floors are 64 breaking cards, and 72 finiſhers. The ſame floors, H and I, in the wing, contain 16 drawing frames and four ſtretching frames or mules, in which the rovings are prepared as deſcribed in our account of the different methods of making rovings. The fifth floor, I, contains the reeling, doubling, and twiſting machines, &c. as we have deſcribed; but the numbers of the different kinds of theſe laſt mentioned machines vary in every mill, according to the kind of cotton which is to be ſpun in it, and that branch of trade its proprietor intended to carry on: if it is for ſpinning twiſt for weavers, only reels will be wanted in the fifth floor; or if it is to ſpin ſtocking yarn, doubling and twiſting machines will be wanted. Indeed theſe laſt machines are altered every few years in cotton mills, according as the ſtate of the trade varies from a demand of one article to another.

The ſpace of the mill, between the walls C and L, contains, as before-mentioned, the ſtaircaſe O, which is of ſtone, aſcending from one floor to the next, and alſo the crane P P. This is a moſt ingenious and uſeful machine, which has been adopted by Meſſrs. Strutts in all their cotton mills, and it is applicable to many other manufactories. The crane conſiſts of a large ſquare baſket, or cradle, four feet ſix inches ſquare in the bottom, withinſide, and ſix feet deep: it is open in front. The bottom is a floor of wood, and the ſides wicker or baſket work ſtrongly bound with iron ſtraps. This baſket or cradle is ſuſpended by a rope in a well P, extending from the top to the bottom of the mill, through all its floors. The cradle exactly fills the well, and is guided by iron ſliders in each angle, ſo that it may be ſteadily drawn up from one floor to any other by the power of the mill, and ſtopped or ſet in motion, either up or down, at pleaſure, by pulling two guide ropes, which are always in reach of a little boy who ſits at the top of the cradle in a ſeat made for the purpoſe. Now the machinery for effecting this is the only difficulty: it is neceſſary, in ſuch a crane, that the machinery, when caſt on to draw up the cradle, ſhould move with a regular and equable velocity, without making any ſhock or jerk when it firſt ſtarts; that it ſhould ſtop the inſtant it is required, otherwiſe it would be very difficult to ſet the cradle, with its floor, exactly on a level with any of the floors of the mill, and if not ſo, it would be very inconvenient for the people to get in or out of it.

The cradle muſt alſo be let down by the power of the mill as well as drawn up, becauſe if ſuffered to run down by its own weight, it would always run down too quick or too ſlow, and be dangerous and uncertain: it muſt, at the ſame time, be ſo contrived, that the cradle itſelf will ſtop the machine if drawn up too high, or let down too low, to prevent its being over-wound and breaking the works. All theſe conditions are effected, in the moſt perfect manner, by very ingenious mechaniſm, which was invented by Mr. H. Strutt, and has been adopted in all his father's mills, rendering theſe cranes as ſafe and manageable as poſſible. The rope ſuſpending the cradle in the well is double, to enſure greater ſtrength, and is conducted over a pulley, or grooved wheel, ſituated in the roof of the mill. The other end has ſuch a weight ſuſpended from it, as will balance the weight of the cradle, together with half the weight of the uſual load the crane is expected to carry. This weight, therefore, draws the rope ſo tight upon the grooved wheel, that it will, by turning round one way or the other, elevate or depreſs the cradle at pleaſure, and at the ſame time the balance weight, which has a ſmall well of its own to work in. The axis of the grooved wheel has a cog-wheel on the end of it, which is turned round by a ſmall pinion fixed on the extremity of an axis on which the mechaniſm is placed: it conſiſts, firſt, of a large wheel, like a coach wheel, ſhewn at *x*, *fig.* 1, fixed on the middle of the axis, and on each ſide of this are two broad riggers or drums to receive the endleſs ſtraps, which give the motion againſt theſe riggers on the outſide of each. A dead pulley or rigger is fitted looſely on the axis, and being exactly the ſame ſize as the live riggers or pullies, the ſtrap can be ſhifted from one to the other in a moment. The axis is actuated by two endleſs ſtraps coming from one drawn at *y*, *fig.* 1, which is turned by wheel-work from the ſhaft in the fifth floor of the mill, as the figure ſhews. One of theſe ſtraps is croſſed between the two drums, and the other is not, ſo that the motion of the two dead pullies on which theſe ſtraps act are always in contrary directions to each other, whilſt the axis on which they run is ſtationary. The two ſtraps are guided by paſſing through eyes attached to a ſide rail of a ſquare frame, which includes the axis with both its riggers and great wheel, and is ſuſpended from the top of the machine by four pendulous rods, ſo that it has free motion to ſwing backwards and forwards in a direction parallel to the length of the axis of the pullies, which motion is communicated by a crank formed on a ſpindle, having a grooved wheel on the end of it. An endleſs rope paſſes over this wheel, and then deſcends to the bottom of the well, where it is ſtrained beneath another wheel, ſo that the two ſides of this rope are always in reach of the boy before-mentioned, who rides in a ſeat at the top of the cradle, giving him the means of turning the wheel and crank either way about, for by pulling down one of theſe guide ropes, he turns the wheel and crank, and draws the ſuſpended frame one way, or by pulling down the other guide rope it is drawn the other. The conſequence of theſe movements is, that the endleſs ſtraps are ſhifted both together on one or other of their live pullies, whilſt the other ſtrap will be ſhifted upon the oppoſite dead pulley; conſequently, the ſtrap which is upon the live pulley turns the axis round one way or the other, drawing the cradle up or down, as it happens to be the croſſed ſtrap, or the oppoſite one, which is ſhifted on the live pulley, fixed on the axis at either ſide of the great wheel, which we firſt compared to a coach wheel. This is, in reality, a brake wheel, having a broad ſtrap ſurrounding the lower half of it, both ends of which are conducted over two pullies, and levers with heavy weights draw down the ends, ſo that it has a conſtant tendency to preſs upwards beneath the wheel, to break, or cauſe ſuch a friction upon it, as will ſtop its motion, when the two endleſs ſtraps are ſhifted upon their dead pullies; but when the ſwinging frame is ſhifted either way, by the boy pulling down one of the guide ropes, which go down to the bottom of the well, and either of the ſtraps are thus ſhifted upon the live pullies, the frame ſeizes the tail of a bent lever on each ſide the wheel, and relieves the weights which draw the ſtrap againſt the wheel, and it hangs quite ſlack beneath the wheel, with a conſiderable ſpace all round, ſo that its motion is quite free, and only under the influence of that ſtrap which, being upon one of the live pullies, gives it motion in either direction. The crank before-mentioned for ſhifting the ſwinging frame is ſo contrived, that it always has a tendency, by means of a weight, to aſſume ſuch a poſition, that it will direct the ſwinging frame, and the ſtraps, both upon the dead pullies and the brake ſtrap, being at the ſame time in contact with the lower half of the wheel, the cradle will ſtand

ſtand ſtill; but when the crank, by pulling one of the guide ropes which go down to the bottom of the well, is turned to ſhift the endleſs ſtraps either way, and conſequently put the cradle in motion, the crank drops into a kind of hitch, or catch, which holds it in that poſition, but not ſo faſt but that it can be relieved in a moment by ſnatching the guide or rope, and if left to itſelf it then aſſumes that poſition in which the crane will ſtand ſtill. By this means the crane is in no danger of any accident, as it is always under the action of one or other of the endleſs ſtraps, which cauſe it to aſcend or deſcend, or it is under the brake ſtrap, which makes it ſtand ſtill, and the great advantage of all theſe movements are, that they act ſo ſoftly, without any ſudden jerks or ſnatches in changing from one ſtate to another. The well has a gate fixed up at every floor to prevent people falling down into the mill, and if any perſon, on the fifth floor for inſtance, wiſhes to deſcend to the third, he goes to the gate and calls the boy, who, with the cradle, is perhaps below, to come to No 5, which he does by ſnatching that guide rope which makes the crane draw up, when he ſees the floor of the baſket come exactly oppoſite the floor of the mill No. 5. He ſnatches the oppoſite rope; this jerks the crank out of its hitch, and it ſhifts the ſtraps and brake, ſtopping the cradle in an inſtant, ſo that it is ſeldom half an inch out of level with the floor. The perſon who wiſhes to go down can now open the gate, which he could not do before, becauſe the latch of the gate is lifted up by the cradle, when its floor is level with the floor of the gate, and ſtepping into the cradle he mentions the floor he wiſhes to go to, and the boy pulls down that directing rope which lets him down, and ſtops it at the floor he wiſhes, by ſnatching the other rope; but if he ſhould pull the wrong, no harm can enſue, becauſe the brake will always act to ſtop the machine, if the ſtraps do not act to move it. The bobbins of the ſpinning frame, and the cops of the mule, are ſet up in little frames mounted on wheels, and thus wheeled along by little children to the crane, and drawn up or let down as required, without any hard labour; in fact the ſtairs are ſeldom uſed except for the people to go up and down when they begin and leave off work.

The ſtove which warms all the mill is ſituated down in the cave beneath the ſtaircaſe: it is very ingeniouſly contrived with an iron cockle, or inverted cubical veſſel, beneath which a fire is made, and the ſmoke eſcapes by a flue behind into a chimney. The air is then brought in a current to ſtrike upon the external ſurface of this cockle, and being thus warmed, riſes up through flues into every floor of the building, where it is admitted in any quantity at pleaſure by regiſters, which are regulated to produce an agreeable warmth, but as the warm air eſcapes again with a draught through a proper ventilator, there is nothing of cloſeneſs connected with it.

Our limits will not permit us to deſcribe more of the ingenious contrivances with which Meſſrs. Strutts' extenſive mills at Belper abound, neither could the reader form a good idea of them without additional plates, and we have already exceeded our propoſed number. Meſſrs. Strutts very liberally permitted the writer of this article to viſit their works, for the purpoſe of compoſing it, to take drawings of the principal machines, which are of the very beſt conſtruction of any in the cotton trade. Theſe would have appeared here, but that the firſt ſix plates of our ſeries were drawn and engraved ſome years ago, being intended for the article Cotton, at a time when the machinery was not brought to that perfection, in point of conſtruction, that it is now. Indeed, the mechanical ingenuity called forth in the whole manufacture of cotton, is beyond the conception of thoſe who have not viſited the countries where it is carried on. The tools and implements employed in conſtructing the different machines are very curious; for as there are ſuch immenſe numbers of each part of every machine to be made, it becomes, in the ſame manner as with the clock-maker, worth the machine-maker's trouble to conſtruct complicated tools and engines to expedite the manufacture of the parts; thus cutting engines for forming the teeth of the numerous wheels, ſee *Cutting* Engine. And here we would remark, that Mr. George Gilpin of Sheffield has, ſince the printing of that article, invented a method of cutting wheels from ſolid caſt iron, with as much accuracy and as good a finiſh as braſs wheels have hitherto been cut, making a very great ſaving in the expence of braſs for a large mill, and much more durable when done. Card wires are manufactured in a very extenſive ſcale in Yorkſhire, and many very curious machines have been invented to diminiſh the labour of cutting and bending the wire teeth, and pricking the leathers for them: but a patent has been lately taken out, by Mr. J. C. Dyer, for a machine which cuts and bends the wires, pricks the leathers, and puts them in all at one operation, and with ſuch rapidity, that it completes four *per* ſecond. It is one of the moſt ingenious and perfect machines we ever met with, and it will prick and ſtick any ſort or ſize of teeth, by altering adjuſtments introduced for that purpoſe. Drawings and a full deſcription of this curious machine are lodged in the patent office by the patentee, who brought over the invention from America, where it has been ſome time in conſtant uſe. Curious lathes for turning ſpindles, and various other circular work, are uſed in the workſhops of the cotton mills and fluting machines, for cutting the flutes in the lengths of the rollers of the drawing and ſpinning frames: in ſhort, ſuch works as Meſſrs. Strutts' at Belper, Mr. Arkwright at Crauford, in Derbyſhire, Meſſrs. Phillips and Lees at Mancheſter, Mr. Peeles' and many others, are ſchools for mechanics in almoſt every department of the ſcience; and good ones too, as the cotton manufacturers in general are convinced, that it is their intereſt to attend to every minutia in the conſtruction of their machines, which may render them more durable or their operations more perfect. Among theſe improvements we may mention, what is becoming very general, *viz.* the addition of governors, or regulating balls, to the water-wheel, which turn the cotton mills, as they always keep it moving at the ſame ſpeed, without which all the machines in the mill act irregularly, and it muſt happen that the velocity of the common water-wheel varies, when any number of machines are ſtopped, or caſt in motion; but the regulated water-wheel always adapts its draught of water to the work it has to perform, preſerving an uniform velocity in itſelf and all the machines it turns. This is brought to ſuch perfection, that many ſuch mills have a clock turned by the mill; cloſe to it another clock, regulated in the uſual manner by a pendulum, and the motion of the mill is ſo regular, that theſe two clocks will never vary more than two or three minutes. Both are made with dials and hands exactly alike, but one has a title on the dial, *mill* time, and the other, *clock* time. We ſhall take an opportunity of explaining a regulated water-wheel, under Water-wheel.

We ſhall here cloſe this article, though we have only gone through the detail of cotton-ſpinning, becauſe the ſubſequent proceſſes of weaving cotton-thread into cloth, dreſſing, finiſhing, printing, &c., have been or will be ex-

plained

plained under the following feveral heads; *viz.* for explanations of the weaving proceffes, fee DRAUGHT *of looms*, or CORDING, DRAW-LOOM, DRAFER, DIMITY, DORNOCK. Though the three laft are rather linen than cotton, ftill the fame proceffes apply in part to the weaving of cotton goods; fee alfo FUSTIAN, and laftly, WEAVING. For the dreffing of cloth after weaving, fee CALLENDAR, or rather PRINTING *of Calico*, which precedes the calendar, except for fome particular goods; and as a part of calico-printing fee DIPPING; alfo BLEACHING, DYEING, DISCHARGING, and WASHING-WHEELS. And, as we have before mentioned, a full account of the wonderful rife and progrefs of the cotton manufacture, which is wholly founded upon the improvements in the machinery for fpinning, will be found under COTTON. Under the head of SPINNING, we fhall defcribe thofe variations of the cotton machines, which have been made to adapt them to the fpinning of flax, wool, and worfted.

MANUFACTURERS. Perfons enticing artificers into foreign countries incur the penalty of 500*l.* and twelve months imprifonment, for the firft offence, for each perfon fo feduced, and 1000*l.* and two years imprifonment, for the fecond offence. (23 Geo. II. c. 13.) And fuch artificers not returning within fix months after warning, fhall be deemed aliens, forfeit all their lands and goods, and be incapable of any legacy or gift. (5 Geo. I. c. 27.) By 22 Geo. III. c. 60. if any perfon fhall contract with, or endeavour to perfuade any artificer concerned in printing calicoes, cottons, muflins, or linens, or preparing any tools for fuch manufactory, to go out of the kingdom, he fhall forfeit 500*l.* and be imprifoned for twelve months; for a fecond offence, 1000*l.* and be imprifoned for two years.

MANUGASTA, in *Geography*, a town of South America, in the province of Tucuman; 20 miles S. of St. Yago el Efteros.

MANULCA, in *Antiquity*, that part of the catapulta to which the cord ufed in working it was fixed.

MANULEA, in *Botany*, fo named, as it fhould feem, from *manulea*, a covering for the hand, in allufion to the form of the corolla, the four fegments of whofe limb pointing one way, and the fifth feparate from them, fuggeft the idea of a glove, at leaft in *Manulea Cheiranthus*. Linnæus, who gave this name, fcarcely ever deigned to give any explanation of the names he contrived, and we offer the above as a conjecture only. Profeffor Martyn leaves it unexplained. Linn. Mant. 12. Schreb. 416. Willd. Sp. Pl. v. 3. 327. Mart. Mill. Dict. v. 3. Thunb. Prod. 100. Juff. 100. Lamarck Illuftr. t. 520. Gærtn. t. 55. (Nemia; Berg. Cap 160.) Clafs and order, *Didynamia Angiofpermia*. Nat. Ord. *Perfonatæ*, Linn. *Pediculares*, Juff. *Scrophulariæ*, Venten.

Gen. Ch. *Cal.* Perianth inferior, in five deep, linear, erect, equal, permanent fegments. *Cor.* of one petal, irregular; tube cylindrical, contracted at the mouth; limb fpreading, in five deep awl-fhaped fegments, the four uppermoft of which are moft connected at their bafe, the lower one being reflexed. *Stam.* Filaments four, very fhort; anthers of the upper two in the mouth of the corolla, thofe of the two lower rather oblong, within the tube. *Pift.* Germen fuperior, roundifh; ftyle thread-fhaped, the length of the lower ftamens; ftigma fimple. *Peric.* Capfule ovate, the length of the calyx, with two cells and two valves, which laft when ripe are half cloven; partition double, formed of the inflexed margins of the valves. *Seeds* numerous, fmall, affixed to an oblong, compreffed, central column.

Eff. Ch. Calyx inferior, in five deep fegments. Limb of the corolla in five deep awl-fhaped fegments, the upper four of which are moft connected. Capfule of two cells, with many feeds.

Obf. The above characters are taken from the original fpecies, *M. Cheiranthus* above-mentioned, but they by no means agree, at leaft in the limb of the corolla, with the generality of thofe fubfequently referred to this genus in the *Supplementum* and elfewhere. Bergius gives as the effential character of his *Nemia*, which includes *M. Cheiranthus* and *rubra* of Linnæus, that the two upper anthers are roundifh, the two lower oblong. This however is probably variable, and certainly not very important. Thunberg indicates no generic character, but enumerates a great number of fpecies, 28, in his *Prodromus Plantarum Capenfium*, four of which have entire, 23 toothed or ferrated, and one pinnatifid leaves. Willdenow admits but 17 in all, not having, when he wrote, feen the fecond part of Thunberg's work.—The chief difficulties are found in diftinguifhing between *Manulea*, *Erinus* and *Buchnera*. Ventenat in his Jard. de la Malmaifon, 15, fuggefts that the two former are moft nearly allied, and differ only in the lobes of the corolla of *Erinus* being more or lefs notched or cloven, while thofe of the genus before us are entire. *Buchnera*, according to this writer, differs fo effentially from both as to belong to a diftinct natural order, the *Pediculares* of Juffieu, as having the partition of its fruit, contrary to the valves; whereas the other two genera, having it parallel, belong to the *Scrophulariæ* of that author. As the matter is fo obfcure, and the plants fo little known, we fhall take a view of all thofe in Willdenow, giving what illuftration is poffible from original fpecimens, and adding what we can that has efcaped him.

1. M. *Cheiranthus*. Hand-flowered Manulea. Linn. Mant. 88. Willd. n. 1. (Lobelia Cheiranthus; Linn. Sp. Pl. 1319. Nemia Cheiranthus; Berg. Cap. 160. Cheiranthus africana, flore luteo; Commel. Hort. v. 2. 83. t. 42.)—Leaves obovate-oblong, ferrated, hairy. Stems nearly leaflefs, fomewhat racemofe. Segments of the corolla taper-pointed.—Native of the Cape of Good Hope, as are all the following fpecies. Commelin cultivated it at Amfterdam in 1697, and named it *Cheiranthus*, from the refemblance of the flower to a hand, an etymology that confirms our explanation of the Linnæan generic name above. The *root* is annual, fpindle-fhaped. *Stems* about a fpan high, erect or afcending, nearly fimple, almoft leaflefs, each terminating in a fimple, elongated, bracteated *clufter*, of numerous yellow *flowers*, whofe form is defcribed in the generic character. The *leaves* are almoft all radical, ftalked, obovate or oblong, ftrongly ferrated, more or lefs hairy, paler beneath. The herbage, calyx, bracteas, and even the outfide of the corolla, are befprinkled with filvery dots or granulations. The *capfule* is elliptical and fmooth, its partition formed by the inflexed margins of the valves, and fo far parallel thereto.

2. M. *corymbofa*. Corymbofe Manulea. Linn Suppl. 286. Thunb. Prod. 102. Willd. n. 2.—"Leaves obovate, toothed, fmooth. Flowers in level-topped, fomewhat umbellate, clufters."—We know nothing of this fpecies but the above characters, given by Thunberg and the younger Linnæus. The *ftem* is faid to be naked.

3. M. *altiffima*. Tall Manulea. Linn. Suppl. 286. Thunb. Prod. 102. Willd. n. 3.—Leaves radical, lanceolate, fomewhat toothed, hairy. Stem elongated, almoft naked. Spike ovate-oblong. Lobes of the corolla rounded. —The *leaves* are all radical, about four inches long, lanceolate, tapering down into a footftalk; their edges unequally

equally toothed; their surface clothed with short glandular white hairs. *Stem* two feet high, erect, hairy in the same manner, scarcely at all branched, terminating in a dense, rather corymbose, *spike*, of numerous, large, and apparently handsome, *flowers*, the segments of whose corolla are unequal, spreading horizontally, of a rounded somewhat kidney-like shape; the mouth closed. *Calyx* hairy, divided to the very base. *Capsule* of the structure proper to the genus.

4. M. *plantaginea*. Plantain-like Manulea. Thunb. Prod. 101. (M. Plantaginis; Linn. Suppl. 286. Willd. n. 5.)—Leaves ovate, obtuse, stalked, entire or toothed, smooth. Stems diffuse, nearly naked. Spikes ovate. Bracteas obovate, longer than the flowers. – *Root* long, fibrous, apparently annual. *Stems* three or four, decumbent, divaricated, about two inches long, simple, almost leafless, hairy. *Leaves* not unlike those of a daisy, ovate, obtuse, smooth, fleshy, occasionally toothed, measuring, with their *footstalk*, rather above an inch in length. *Spikes* mostly solitary, short, round and dense, of many small *flowers*, separated by obovate, obtuse *bracteas*, twice their own length, whose base only is hairy. *Calyx* bell-shaped, hairy, not very deeply divided. Segments of the *corolla* rounded, and some of them, if we mistake not, cloven, in which case this plant becomes an *Erinus*.

5. M. *linifolia*. Flax-leaved Manulea. Thunb. Prod. 100. —"Leaves linear, nearly entire, rough with minute hairs." —We received from Kew garden in 1791, specimens by the name of *Manulea*, which answer exactly to the above characters of Thunberg, of whose plant we have no further information, it not being described by Linnæus or Willdenow. Our's has a slender, branched, leafy, nearly smooth *stem*. The *leaves* are opposite, stalked, an inch and half long, about a line broad, bluntish, rough with minute glandular pubescence; their margin occasionally toothed; their base tapering into a slender footstalk. *Flowers* numerous, in loose, compound, terminal clusters, with small oblong *bracteas*. *Calyx* small, obtuse, smooth. *Corolla* slender, above half an inch long, its tube glandular in the upper part, its limb of a rich deep yellow, in five oblong, obtuse segments, whose edges are reflexed, and one of which seems more spreading than the rest, as in the first species.—Can what we describe be *Buchnera viscosa*, Ait. Hort. Kew. ed. 1. v. 2. 357? L'Heritier's figure has never appeared.

6. M. *pinnatifida*. Pinnatifid Manulea. Linn. Suppl. 286. Thunb. Prod. 102. Willd. n. 4.—"Leaves ovate, pinnatifid; their segments toothed."—This we have not met with.

7. M. *capitata*. Capitate Manulea. Linn. Suppl. 286. Thunb. Prod. 101. Willd. n. 6.—"Leaves ovate, serrated, villose. Flowers in globose heads. Branches diffuse."—Such is the Linnæan character, but Thunberg says the *leaves* are oblong and smooth. It seems next akin to M. *plantaginea*.

8. M. *antirrhinoides*. Snap-dragon Manulea. Linn. Suppl. 286. Thunb. Prod. 101? Willd. n. 7.—"Leaves ovate, toothed, smooth. Flowers alternate."—Here again is some contrariety between Linnæus and Thunberg. The latter, who gathered the plant, defines it "leaves ovato-lanceolate, serrated, villose. Heads of flowers globose. Stem erect." Linnæus says it looks like an *Antirrhinum*. We have in vain attempted to determine it by his herbarium.

9. M. *thyrsiflora*. Crowded-flowered Manulea. Linn. Suppl. 286. Thunb. Prod. 102. Willd. n. 8.—"Leaves obovate, downy, toothed. Corymb terminal, elongated, compound."—Thunberg describes the *leaves* as crenate, the *flowers* panicled. We have what seems to be this species, gathered by Sparrmann in shady places at the Cape. The *stem* is somewhat shrubby, and very much branched, hairy. *Leaves* opposite, hairy, strongly toothed. *Inflorescence* at first corymbose, afterwards becoming more loose and panicled. *Calyx* hairy, with long slender divisions, not quite separate to the base. Segments of the *corolla* obovate.

10. M. *argentea*. Silvery Manulea. Linn. Suppl. 286. Thunb. Prod. 102. Willd. n. 9.—Leaves alternate, obovate, wedge-shaped, serrated, besprinkled with silvery dots. Flower-stalks axillary, single-flowered, longer than the leaves. —Thunberg's own specimen, given to Linnæus, here leaves no doubt on our minds, though their definitions of it a little vary. The *stem* is woody, with numerous crowded leafy branches. *Leaves* stalked, small, alternate, with little axillary tufts of still smaller ones; their form obovate or roundish, strongly serrated, wedge-shaped and entire at the base; the under side, more especially, clothed with glandular silvery dots, as is also the deeply-divided *calyx*. Segments of the *corolla* rounded. The *flower-stalks* are solitary, axillary, simple, smooth, about an inch long, much exceeding the leaves. *Capsule* proper to the genus. The plant turns black in drying.

11. M. *oppositiflora*. Opposite-flowered Manulea. Venten. Malmaif. t. 15.—Shrubby, downy. Leaves opposite, ovate, deeply serrated. Flower-stalks axillary, single-flowered, the length of the leaves.—M. Ventenat describes this as a native of the Cape, flowering profusely during the summer and autumn. It has the shrubby habit and aspect of the last, but the opposite *leaves* and *flowers* clearly distinguish it. If *Buchnera pedunculata*, Andr. Repos. t. 84, be, as Ventenat says, generically distinct, and even essentially different in its capsule, from these two species, it must be allowed their habit is too similar to make such a difference credible in all the force he allows it.

Buchnera æthiopica and *capensis* of Linnæus if, as Thunberg now makes them, species of *Manulea*, should follow here, the former being nearly akin in habit to the two or three last described. But as habit seems treacherous with regard to these plants, we dare not decide. See BUCHNERA.

12. M. *tomentosa*, Woolly Manulea. Linn. Mant. 420. Willd. n. 10. Jacq. Ic. Rar. t. 498. Curt. Mag. t. 322. Thunb. Prod. 101. (Selago tomentosa; Linn. Sp. Pl. 877.) —Leaves obovate, downy, bluntly toothed. Stem leafy. Cluster compound, terminal, many-flowered.—Mr. Masson is said in the Hort. Kew. to have introduced this species into the gardens of Britain in 1774. It is we believe naturally shrubby and perennial. The *branches* are round, leafy, and they, as well as the foliage, inflorescence, and even the outside of the flowers, are clothed with dense hoary pubescence. *Leaves* mostly opposite, an inch or more in length, obovate, very obtuse, unequally and bluntly toothed. *Flowers* very numerous, in a dense, compound, hoary cluster, produced from May to November, having, according to Mr. Curtis, "a singular but unpleasant smell, not perceptible at a distance." The outside of the *corolla* is pale yellow, as is the upper side of the limb when first expanded, but the latter gradually assumes a deeper and deeper orange. There is a great affinity between these flowers and those of our M. *linifolia*, n. 5.

13. M. *rubra*. Red Manulea. Linn. Suppl. 286. Thunb. Prod. 102. Willd. n 11. (Nemia rubra; Berg. Cap. 161.)—Leaves lanceolate, toothed, villous. Cluster lax. Flowers nearly sessile. Linnæus had no specimen of this. Bergius describes it with an herbaceous, round, nearly

smooth

ſmooth *ſtem*. Upper *leaves*, (or *bracteas*,) linear, toothed, rough, ſeſſile; the lower he had not ſeen. *Cluſter* terminal, very long and ſlender, its branches alternate, diſtant and erect, the flowers nearly ſeſſile. *Calyx* fringed. Tube of the *corolla* long, ſlender, pale red, thickened and hairy upwards; ſegments of the limb linear-ovate, obtuſe, hairy beneath, ſpreading, nearly equal, revolute in the margin, deep ſcarlet.

14. M. *capillaris*. Capillary Manulea. Linn. Suppl. 285. Thunb. Prod. 101. Willd. n. 12.—"Stem-leaves obovate, ſmooth; thoſe of the branches linear. Spikes ovate." Linn. Thunb.

15. M *cuneifolia*. Wedge-leaved Manulea. Linn. Suppl. 285. Thunb. Prod. 101. Willd. n. 13.—Leaves elliptic-ovate, toothed, nearly ſmooth. Spikes at length oblong. Calyx fringed.—The *ſtem* is ſhrubby, much branched, leafy, round and downy. *Leaves* nearly oppoſite, ſtalked, about half an inch long, ovate, obtuſe, with coarſe blunt ſerratures; both ſides occaſionally ſlightly hairy, often ſmooth. *Spikes* terminal, ſolitary; at firſt denſe and almoſt capitate, with a linear, obtuſe, fringed *bractea* to each *flower*, longer than the flower itſelf. Segments of the *calyx* very deep, linear, obtuſe, fringed with ſoft hairs. As the *fruit* advances, the ſpike becomes very long. The lobes of the *corolla* are rounded, obtuſe and entire. *Capſule* elliptical, narrow, obtuſe, with a ſtrong furrow at each ſide.

16. M. *cærulea*. Blue Manulea. Linn. Suppl. 285. Thunb. Prod. 101? Willd. n. 14.—"Leaves linear, oppoſite, downy, toothed. Flowers racemoſe." *Linn.*—Thunberg defines the *leaves* as lanceolate, the *flowers* axillary and ſolitary. We have ſeen no ſpecimen.

17. M. *heterophylla*. Various-leaved Manulea. Linn. Suppl. 285. Thunb. Prod. 101. Willd. n. 15.—"Leaves linear, ſcattered, villoſe, entire or toothed." *Linn.*—Thunberg ſays "lower leaves ovate, ſomewhat toothed, villous; upper linear entire. Heads of flowers globoſe." We know no more of this than of the laſt.

18. M. *integrifolia*. Entire-leaved Manulea. Linn. Suppl. 285. Thunb. Prod. 100. Willd. n. 16.—Leaves oppoſite, ovate, nearly entire, ſmooth. Flower-ſtalks axillary, ſingle-flowered, the length of the leaves.—This is perhaps next akin to our tenth and eleventh ſpecies, though eſſentially different in its *leaves*, being at moſt but ſlightly ſerrated. They greatly reſemble thoſe of *Thymus Acinos*, and the ſpecies might well have been named *thymifolia* or *ocymifolia*. The *ſtem* is ſhrubby, round, much branched. *Leaves* oppoſite, on ſhort downy footſtalks, which embrace the ſtem; nor are they by any means ſcattered, as Linnæus defines them. *Calyx* ſmooth, its ſegments long and narrow. Tube of the *corolla* ſwelling upwards; ſegments of the limb rounded, obtuſe.

19. M. *microphylla*. Small-leaved Manulea. Linn. Suppl. 285. Thunb. Prod. 100. Willd. n. 17. (Pluk. Phyt. t. 272. f. 7.)—Leaves denſely tufted, ovate, entire, ſmooth. Flower-ſtalks lateral, ſolitary, ſingle-flowered, downy, much longer than the leaves.—Gathered by Sparrmann as well as Thunberg at the Cape. *Stem* woody, with very numerous *branches*, along which are arranged crowded denſe tufts of innumerable, extremely minute, *leaves*, each tuft ſeeming the rudiment of a future branch. The *flower-ſtalks*, ſcattered here and there, are about half an inch long, ſolitary, ſimple, aſcending, rigid. Segments of the *calyx* oblong, obtuſe, downy, deeply ſeparated. Plukenet perhaps repreſents the *calyx*, not the *corolla*; the latter we have not ſeen. His figure was juſtly indicated by Linnæus himſelf on the ſpecimen, though omitted in the *Suppl.*

We ſubjoin the remaining ſpecies of Thunberg, without regard to the order in which they ought to come, as we have no means of correctly aſcertaining it.

20. M. *revoluta*. Revolute Manulea. Thunb. Prod. 100.—"Leaves linear, entire, revolute in the margin. Flowers axillary."—This he places next after his *linifolia*; ſee n. 5.

21. M. *incana*. Hoary Manulea. Ibid. 101.—"Leaves oblong, ſerrated. Spikes level-topped. Calyx hoary."—Before *cuneifolia*, n. 15.

22. M *divaricata*. Spreading Manulea. Ibid.—"Leaves elliptical, toothed. Spike terminal, level-topped."

23. M. *virgata*. Wand-like Manulea. Ibid.—"Leaves obovate, ſerrated, villous. Branches panicled. Flowers alternate, remote."

24. M. *cephalotes*. Great-headed Manulea. Ibid.—"Leaves oblong, unequally ſerrated, ſmooth. Flowers ſomewhat umbellate."

25. M. *hirta*. Hairy Manulea. Ibid.—"Leaves obovate, doubly ſerrated, hairy. Flowers axillary, remote."

26. M. *hiſpida*. Hiſpid Manulea. Ibid. 102.—"Leaves ovate, ſerrated, villous. Stem decumbent."

27. M. *cordata*. Heart-leaved Manulea. Ibid.—"Leaves heart-ſhaped, ſerrated. Stem decumbent, creeping." S.

MANUMISSION, MANUMISSIO, an act whereby a ſlave, or villain, is ſet at liberty, or let out of bondage.

The word comes from the Latin *manus*, *hand*, and *mittere*, *to ſend*; *quia ſervus mittebatur extra manum, ſeu poteſtatem domini ſui.*

Some authors define manumiſſion an act by which a lord enfranchiſes his tenants, who till that time had been his vaſſals, and in a ſtate of ſlavery, inconſiſtent with the ſanctity of the Chriſtian faith.

Among the Romans, the manumiſſion of ſlaves was performed three ſeveral ways. 1. When, with his maſter's conſent, a ſlave had his name entered in the cenſus, or public regiſter, of the citizens. 2. When the ſlave was led before the prætor, and that magiſtrate laid his wand, called *vindicta*, on his head. 3. When the maſter gave the ſlave his freedom by his teſtament. Servius Tullus is ſaid to have ſet on foot the firſt manner; and P. Valerius Publicola the ſecond. A particular account is given of the third in the Inſtitutes of Juſtinian.

It was not neceſſary that the prætor ſhould be on his tribunal to perform the ceremony of manumiſſion: he did it any where, indifferently, in his houſe, in the ſtreet, in going to bathe, &c. He laid the rod on the ſlave's head, pronouncing theſe words, "Dico eum liberum eſſe more Quiritum," "I declare him a freeman, after the manner of the Romans." This done, he gave the rod to the lictor, who ſtruck the ſlave with it on the head, and afterwards, with his hand, on his face and back; and the notary or ſcribe, entered the name of the new freed-man in the regiſter, with the reaſons of his manumiſſion.

The ſlave had likewiſe his head ſhaved, and a cup given him by his maſter, as a token of freedom. Tertullian adds, that he had then alſo a third name given him: if this were ſo, three names were not a token of nobility, but of freedom.

The emperor Conſtantine ordered the manumiſſions at Rome to be performed in the churches.

Of manumiſſion there have alſo been various forms in England. In the time of the Conqueror, villains were manumitted, by the maſter's delivering them, by the right hand, to the viſcount, in full court, ſhewing them the door, giving them a lance and a ſword, and proclaiming them free. Others

Others were manumitted by charter. There was alfo an implicit manumiffion; as when the lord made an obligation for payment of money to the bondman at a certain day; or fued him, where he might enter without fuit; and the like.

MANUPELLA, in *Geography*, a town of Naples, in Abruzzo Citra; eight miles S. of Civita de Chieta.

MANURE, in *Agriculture*, that fort of fubftance or material, whatever its nature may be, that has the property or effect when applied on, and incorporated with a foil, to increafe its fertility, and thereby promote the growth of different kinds of plants, fuch as thofe of the grain, grafs, and other defcriptions.

It may be noticed, that the fubftances capable of being made ufe of in this way, are extremely numerous, and of different natures and properties. It has been ftated by a late writer, that on account of the changes that are continually taking place among bodies in nature, and the new combinations that are formed in confequence of them, a vaft variety of matters are unfolded, elaborated, and prepared for the nourifhment and fupport of vegetables; fome of which poffefs a high degree of fluidity and volatility, as water, various gafeous materials, as oxygen, hydrogen, azote, and carbonic acid, in different ftates of combination, with other more fubtile and elaftic fluids, which are principally formed and applied in or upon the foils on which the plants grow and exift; and in larger or fmaller proportions, according to the feafon of the year, the nature of the climate in refpect to heat or cold, and the ftate or condition of the land in regard to its properties; while others exift in a more grofs and heavy ftate of connection with the different materials, and require to be applied and blended with the foils, or fpread out upon their furfaces, in order that they may exert their influence in promoting vegetation. But it is thefe laft, as being the chief means of fupporting various forts of plants, as crops, that are confidered as manures, though it is plain they muft undergo different changes to fit them for the purpofe. In addition it is likewife remarked, that in the various fubftances applied in this way, there are great differences; "fome are found to yield the matters which are neceffary for the fupport of plants much more readily, and more abundantly than others, as animal, vegetable, and all fuch fubftances as are rich in mucilage, faccharine matter, and calcareous earth, and readily afford carbon, phofphorus, and fome aerial fluids, fuch as have been mentioned; while others that are greatly deficient in all or many of thefe principles, or do not readily part with them, are found to be of much lefs utility, when employed in the way of manures." It is fuppofed that this is "a principal reafon why fome forts of manures or fubftances, when put upon grounds, are fo greatly fuperior to others, ufed at the fame time, and in the fame manner and proportion." But befides thefe there are "other ways in which fubftances, when applied to foils, may render them more fertile and productive, and contribute to the aid of vegetation. Some, befides furnifhing fuch matters as are fuitable for the purpofe of promoting the growth of plants, are known to add confiderably to the quantity of vegetable and other matters contained in the foils on which they are placed, and thereby provide a more fuitable and convenient bed for the reception of the roots of plants; others contribute little in this way, but operate chiefly upon fuch materials as are contained in them, breaking down their organization or texture, and thus fetting at liberty different volatile and other ingredients, by which new compounds are formed, and brought to fuch ftates as are the moft adapted to the fupport of vegetable life; others again act principally by producing certain changes and alterations in the conftitution or texture of foils, fuch as rendering them more open and porous, or more ftiff and compact, and by fuch means bringing them into the moft proper conditions for the bearing of different vegetable productions; and there are ftill others that contribute in all or feveral of thefe ways at the fame time."

By different inquirers thefe fubftances have indeed been conceived to "operate in all the different ways by which vegetation is promoted: by imparting to the foil with which they are mixed the vegetable food which they contain: by communicating to it a power of attracting this food in greater plenty from the air: by enlarging the vegetable pafture: by diffolving the vegetable food which it is already poffeffed of, and fitting it for entering the roots of plants. Some afford nourifhment only; as rape-duft, foot, malt-duft, pigeons' dung, and in general all top or hand-dreffings. Others give nourifhment, and alfo add to the foil; as animal dungs, and all rotten animal and vegetable fubftances. Others again open the foil, and do not nourifh in their own nature; as lime, light marles, fand, &c. And laftly, other manures ftiffen the foil, and at the fame time nourifh a little; as clay, clay marles, and earth." Matters of this kind have alfo been "confidered by different agriculturifts as fimple and compound; as natural and artificial; nutritious and ftimulating, or folvents and mucilages; mechanical or chemical; as animal, vegetable, and mineral, &c." All which diftinctions may have their ufe, but are each attended with difficulties, and liable to objections. "Some of them operate in all the ways above-mentioned; and there are probably none that do not operate in more ways than one. It is a fundamental miftake to fuppofe with Tull, that tillage may be fubftituted in the place of manure. Manures will indeed be of little avail without it; but although good tillage, by feparating the foil, may bring a greater number of nutritious particles within the reach of the crop, yet the foil cannot poffibly continue to be fo completely divided as it is by the fermentation excited by dung and other manures; which are found to enrich the beft pulverized foil again and again, after it is exhaufted by crops; and therefore promote vegetation by increafing the quantity of vegetable food. Some manures lofe part of their ftrength by being long expofed to the air. Thus after dung is fufficiently fermented, the longer it lies, the lefs is its value. Cow-dung dried on the pafture, gathered and laid upon other land, has fcarcely any effect; whereas the fame quantity carried from the cow-houfe, or collected by folding the cattle, enriches the land. Hence this kind of manure contains the vegetable food in itfelf, and does not receive it from the air. Other manures, on the contrary, operate fooner, and with greater violence, the longer they are expofed to the air, before they are ufed. Lime and marles are of this kind. They are obferved to have a ftrong power of attracting certain qualities from the atmofphere; and operate by communicating to the foil with which they are mixed a power of attracting vegetable food from the air." And further, "fome manures exhauft land of its vegetable food, and do not reftore it again when immediately applied. This is thought by fome to be the cafe with lime. Land thoroughly limed, after having carried many very good crops, feems to be exhaufted, and reduced to a worfe fituation than before. When in this cafe lime has been applied a fecond time, its effects have been found to be far inferior to what they were when firft applied. This manure, therefore, feems to operate by diffolving the vegetable food which it meets with in the foil, and fitting it for entering the roots of plants. It may however be noticed, that the exhauftion of land by lime, is owing to bad management and unmerciful forcing it with continued white crops. It is not certain that land will not bear a fecond liming.

 But

But it is certain that the effects of the lime may be long kept up by the proper application of dung and other faponaceous manures; and there have been inftances of the effect of lime continuing forty, fifty, or even a hundred years." It is certain that almoft "all kinds of manures contribute to open the foil. Any perfon may be convinced of this, who will take the trouble to compare a piece of land on which dung or any other manure has been laid, with a piece contiguous that has not been manured; he will find the former much fofter, much more free and open than the latter. It muft be allowed, therefore, that all manures operate by enlarging the vegetable pafture of plants."

Hence, on account of the great differences that are thus met with in the properties and principles, as well as in the agency of the matters that are made ufe of as manures, it is difficult to bring them into any fort of practical arrangement. That which tends to fhew the nature and qualities of the materials from which they are derived, feems to be the moft advantageous in the cultivation and improvement of land.

Manures of the animal Kind.—It may be obferved, that the materials which conftitute this fort of manure, are of very different kinds, but they may be conveniently diftinguifhed into fuch as are of a *foft* and *hard* quality; the former comprehending all forts of animal dungs, and various other animalized materials of a foft nature; the latter including all forts of hard animal matters, fuch as bones, horns, hoofs, and different other fubftances of a fimilar kind. It has indeed been remarked by a late practical writer, that "all fubftances of the animal kind, when reduced by the procefs of putrefaction or other means into a foft, pulpy, or mucilaginous condition, have been fhewn, by the experience of the moft correct and able cultivators, to afford thofe matters which are fuited to the nutrition and fupport of plants, with greater readinefs, and in a more copious manner, than moft other bodies. And chemical analyfis has demonftrated, that the chief component materials of fuch fubftances, fo far as agriculture is concerned, are principally water, jelly, or mucilage, and faccharine oleaginous matters, with fmall portions of faline and calcareous earthy fubftances. Hence animal matters, though they agree, in fome circumftances, with vegetable productions, each having in common water, faccharine and calcareous matters, are far more compounded; and in animal fubftances fome of thefe materials are in large proportions, while in vegetables they only exift in a very fmall degree; and the jelly, which in fome meafure refembles the gum and mucilage of plants, differs likewife from them, in its having much lefs tendency to become dry, as well as in its property of attracting humidity from the atmofphere, and of running with great rapidity into the ftate of putrefaction and decay." And in addition, "all thefe principles of animal fubftances are, it is added, refolved by their ultimate decompofition into other matters, fuch as the different gafeous fluids that have been mentioned above, carbon, phofphorus, lime, &c." It is likewife fuppofed, that "in animal fubftances of different forts, there may be differences in regard to the proportions of thefe feveral ingredients or principles; fome kinds affording one or more of them in greater abundance than others; while others again are deficient in thefe, but abound in fome of the others. On this fuppofition, the different effects of fubftances of the fame clafs, when applied to foils of the fame kind, may, it is conceived, be eafily accounted for."

It is found, that all fubftances of this kind, "on being deprived of their vital principle, have a quick tendency to take on or run into the ftate of putrefaction, a procefs which is confiderably affected and influenced by the circumftances under which it is produced. But in the horny and more compact animal matters, this tendency to putrefaction and decompofition is, under fimilar circumftances, much lefs rapid than in fuch as are of a lefs firm and denfe texture. The procefs of putrefaction is, however, greatly expedited by the conditions under which it takes place being favourable: fuch as the fubftance, of whatever kind it may be, poffeffing fufficient moifture, being expofed to the free action of atmofpheric air, and a moderate degree of heat. On various accounts it would likewife appear, that the decompofition of fuch fubftances may be promoted by moiftening them with water, flightly impregnated with common falt, and perhaps fome other faline fubftances, fuch as the muriats of magnefia and foda, or fea-falt, as ingenioufly fuggefted by the earl of Dundonald."

And it is thought probable, alfo, "that the decompofition of fome of the more hard and folid fubftances of this defcription, fuch as horns, bones, hoofs, and rotten rags, &c. might be greatly promoted, and rendered more immediately ufeful, by being reduced into much fmaller particles than has been ufually the practice, as well as by the application of higher degrees of heat than that of the atmofphere, when it can be done with convenience, and in a fufficiently cheap manner.

It is likewife further ftated, that "as the diffolution of animal as well as vegetable matters, is known to be much impeded by their being excluded from the air, or expofed to fuch degrees of heat as are capable of drying up and taking away their moifture, and by the mixing of fuch earthy fubftances with them as are capable, from their open and porous textures, or vitriolic and other qualities, of depriving them of the fluid matters which they contain; it is evident, why under certain circumftances of their being mixed and applied as manures, they may prove lefs beneficial than in other inftances."

There are other circumftances, befides thofe which have a tendency to render the decompofition of all fuch matters more quick and expeditious, as thofe of their being lightly depofited together, and not in too large heaps, or with too much earth mixed with or depofited upon them, by which the air is prevented from acting upon them fo extenfively as might otherwife be the cafe. The practice of fprinkling common water over them frequently, efpecially in hot and dry feafons, and where they are of the more hard and compact kinds, in many inftances might, probably, be ufeful in promoting their diffolution, and rendering it more fudden and complete, confequently, to fupply the food of plants more readily, and in greater abundance in any given time.

But the principal fubftance, and that which is moft commonly applied as a manure, is the excrement produced by various kinds of animals, which is found in very different conditions, or ftates of preparation and richnefs, in fome meafure according to the kind of food on which the animal has been fed, and the materials with which it is incorporated or intermixed. The writer of the Middlefex Report fays, that "the dung of fat animals is unqueftionably more rich, and, confequently, poffeffes greater powers of fertilization, than the dung of lean ones; and that the quality of the dung of every fort of animal will, in a great meafure, be proportioned to the goodnefs or poverty of its food. Thus, when the animal is fed on oily feeds, fuch as lint, rape, and others of a fimilar nature, it will be the moft rich; when kept on oil cake, or thofe feeds which have been deprived of part of their oily matter, the next fo; on turnips, carrots, and fuch like vegetable roots, the next; on the beft hay, next; on ordinary hay, next; and on ftraw, perhaps, heaps, the pooreſt of all. The dung of lean hard-working cattle, feeding on ſtraw, muſt, he conceives, be poor indeed."

It may be noticed, that the ſoil of privies is ſometimes met with in a ſtate fit to be applied to the ground, when not much mixed with fluid matters, ſuch as urine, and forms a moſt excellent manure. It moſt frequently happens, however, that it is in ſuch a liquid ſtate, as to require other more ſolid ſubſtances to be blended with it, before it can be conveniently applied to the ſoil. In doing this, a late writer ſuggeſts, that "too little regard ſeems to have in common been paid to the choice of the moſt proper materials; but it is obvious, that ſuch as can be the moſt fully acted upon, and the moſt readily converted into the ſtate ſuitable for affording the nutrition of vegetables, by the principles of the matters thus employed as manures, muſt be the moſt adapted for the purpoſe, as well as the moſt beneficial. When, therefore, the manure made uſe of in this way, is either wholly or principally conſtituted of ſuch animalized matters as, from their fluidity, are in an improper ſtate or condition to be ſet on land, without having other ſubſtances previouſly mixed with them, ſuch peaty, boggy, or black vegetable earths ſhould be choſen, as contain large proportions of matter, which the ammonia or volatile alkali ſo abundantly provided by the decompoſition of ſuch ſubſtances may exert itſelf upon, and reduce into that ſtate of ſolubility which is ſuitable for promoting the growth of plants. By duly attending to this practice, which has been ſcientifically handled by the earl of Dundonald, much advantage may be gained, not only in the quantity, but likewiſe in the quality of the manure. The reſults of experiments attentively made in this way, indeed clearly demonſtrate, that an inconceivable loſs is incurred by the inconſiderate practice of exſiccating human excrement, as well as the negligent cuſtom of permitting the liquor or fluid parts of dung heaps to run away. The trials which he has been enabled to make, alſo lead him to ſuſpect, that it is a much more waſteful practice, to apply theſe liquors to the ground in their uncombined ſtate, than in conjunction with ſuch earthy materials as have been mentioned above. Beſides, much of them muſt be imperceptibly carried off by the proceſs of evaporation, even when they are carried out in the moſt favourable ſeaſons of the year; and they cannot, in this way, always be made uſe of on thoſe ſoils that contain a ſufficient quantity of thoſe earthy materials, or principles, with which they can readily form combinations, and exert their moſt beneficial and fulleſt effects."

And it is farther ſtated in the ſame practical work, that "moſt of the later practical writers on agriculture are decidedly of opinion, that the ſoil of privies is a manure of the moſt enriching kind, but that its effects are not ſo laſting as thoſe of many other ſubſtances. In the trials which have been lately made with it by Mr. Middleton, "it is ſaid to have produced ſuch aſtoniſhing fertility, as to induce him to conclude that it exceeds all other ſorts of manure that can be put in competition with it, for the firſt year after its application. The ſecond year he ſuppoſes it of ſome ſervice, but in the third its effects nearly, if not quite, diſappear." The circumſtances which render this ſort of manure ſo immediately active in promoting vegetation, and ſo quickly deprived of its beneficial influence, would ſeem to be the great quantity of elaſtic principles which it contains, in a looſe ſtate of combination, and the ſmall quantity of earthy matter which it is capable of ſupplying to the ſoil, by the laſt ſtages of decompoſition or decay. This alſo further ſhews the advantage of mixing and incorporating with it ſuch kinds of earthy ſubſtances as it may be capable of acting upon, and uniting with. From the cauſes juſt noticed, its moſt active and nutritious properties are almoſt immediately ſet at liberty, and either directly contribute to the growth of plants, or form ſuch new combinations as readily become uſeful for the purpoſe, while but very little of the earthy material is left behind for further decompoſition, and the durable aids of vegetable increaſe. Mr. Middleton alſo farther remarks, that this matter is not only prepared in the moſt ſuitable manner for the purpoſe of perfect vegetation, but that the herbage produced by it is capable of fattening the *largeſt* cattle in *leſs* time than any other. And the firſt of theſe writers knows from repeated experiments, that the fineſt garden vegetables may be produced by it, when properly employed, without the leaſt injury to their taſte, even in the moſt delicate of them, ſuch as cauliflowers, white brocoli, &c. Inſtead of a bad taſte being communicated to herbage by the uſe of this manure, it would ſeem probable, that it conſiderably improves its flavour, as it has been obſerved, in the Annals of Agriculture, that the patches of ſuch paſtures as had been manured with this ſubſtance, were conſtantly eaten *quite cloſe* by horſes, cows, and young cattle, while in other places there was much *longer graſs*."

From theſe facts it is therefore concluded, that "the importance of this ſubſtance as a manure is ſuch, that every poſſible means ſhould be contrived to prevent its loſs, which is ſhamefully permitted, at preſent, to take place in large towns, to the aſtoniſhing extent of more than two-thirds of the whole, and ſome method made uſe of to render its conveyance and application more general and convenient. See NIGHT-SOIL.

It is further noticed, that it is not only this, but the dungs of all thoſe animals which feed on ſuch ſorts of food as conſtitute either wholly, or in a great part, the food of man, as has been ſuggeſted above, that are, from the experience of practical farmers, found to be more effectual in promoting vegetation, when applied as manures to the ground, than thoſe of ſuch animals as are ſuſtained by ſuch kind of matters as are ſeldom or ever made uſe of in that way; "hence it is obvious that the dungs of carnivorous birds, dogs, ſwine, horſes highly fed, poultry, pigeons, and ſuch like animals, muſt be more powerful in their effects as manures, than thoſe of horſes when fed only with hay or graſs, neat cattle, ſheep, and other animals that live in the ſame manner. On the ſame principle, too, it is ſuggeſted as not improbable, but that the excrement of inſects may be leſs efficacious as manures than their bodies, as it is well known that by their deſtruction and decompoſition the fertility of land is conſiderably increaſed in particular inſtances. It is probable likewiſe, that the dungs of ſome animals may, from the ſtate of their ſtomachs, and other cauſes, as well as the nature of their food, be more completely reduced and animalized in its paſſage through their bodies. That this is the caſe, at leaſt in granivorous birds, in which the food is ſubjected to conſiderable trituration in the courſe of its digeſtion, there can be little doubt, and thereby they perhaps become, in ſome meaſure, in a condition more ſuitable to form new combinations, or afford the ſupport of vegetation."

It is conceived, that "this view of the nature of the manures afforded by different animals, ſhould lead the practical agriculturiſt to be more attentive to the ſubject, in order that he may render them more abundant, and be capable of employing them under the moſt favourable circumſtances, which cannot be the caſe while they are, as at preſent, indiſcriminately mixed and blended together in the common dung-heap. That they ſhould not be uſed in this way is clear,

clear, from the contradictory accounts of them that have been presented to us by various writers and experimenters, which would seem to have been caused by employing them in states of mixture with other substances. By some it is asserted that one load of *swine's-dung* is nearly equal to two of most other sorts, and that it is the richest of all animal manures; in this, however, they would seem to be mistaken, as from trials made by others, it has been shewn that *night-soil* is certainly to be ranked much before it. In some of the ingenious experimental attempts of Mr. Young, it is also shewn, that the dungs of rabbits and poultry are superior to that of pigeons, and greatly more durable. But poultry-dung, in the comparative experiments of Mr. Arbuthnot, was found to be more effectual than that of rabbits, and that of the latter greatly superior to wood-ashes. *Pigeons' dung* has, notwithstanding, been proved by much experience to be a powerful and efficacious manure, and probably, from its abounding with volatile alkaline principles, been concluded to be of a hot or stimulating quality." But it is "from the larger animals that the farmer derives the principal part of the dung that is made use of as a manure in the cultivation and improvement of land; the dung of horses as are highly fed being found, as has been already seen, to be much more valuable for the general purposes of agriculture, and some uses in horticulture, than that which is made by horses when fed with hay or grass only. Where the animals are kept in the latter way, it is probably not so good as that of well fed cows and neat cattle in general, as in these it may, perhaps, become more animalized from the circumstance of their food being more intimately blended with the *saliva*, or other juices, during the ruminant state of feeding in such animals. The dung of horses is, however, in common, much more disposed to take on the process of putrefaction, and cause more heat, than that of cows and other neat cattle, and indeed these are the chief distinguishing circumstances between them as manures. The dung of neat cattle may also, on account of its less disposition to run into the state of putrefaction, contribute more of the earthy material to the land on which it is applied. Hence, probably, its superior utility on the leaner and poorer, or thinner sorts of soil. The dung and urine of animals, when newly voided, are not, except when the animals are morbid, in a putrescent condition, the length of time in which they remain in their bodies being too short for its fully taking place; but some degree of, or tendency to putridity, is constantly necessary to their discharge; and the means which are further suited to promote it in these substances have been fully described and explained above, when speaking of the nature of animal substances in general.

With respect to the experiments that have been made with the dung of sheep, they shew "that it is equally valuable with that of many other animals that feed in the same way, but agriculturists have not yet turned their attention sufficiently to the means of collecting and preserving it, so that it may be used alone as a manure. The method by which it is at present applied to land, is by folding the animals upon it, under which method of management, on many soils, a great part of the advantage must be derived from the operation or action of the ammonia of their urine upon the vegetable matters contained in them, as well as from the consolidation produced by their treading upon it. See DUNG.

Besides the above, there are many other *soft animal substances* that may be of use for the purpose of improving land as manures, some of which have yet been but little attended to by the farmer. Of this sort are *graves*, or the residuum which is left after making of candles, and the *scum* which is collected in the boiling or refining of sugar. The author of a late practical work observes, that "different trials upon a small scale, with the former, have fully convinced him, that it is a substance that possesses great powers, when employed as a manure. And although it is a substance which is generally procured at a high price, from its going a great way, and being a lasting manure, it may, probably, be more frequently had recourse to than has hitherto been the case. It is mostly procured in the state of hard compressed square cakes, though sometimes in a soft condition, without having undergone any pressure. When, in the former state, the cakes must be broken down, and reduced into as great a state of division as possible, which may be rather a troublesome and expensive process, except a mill or some proper machine for the purpose be employed. But when it has been even reduced to the finest state possible, it will still be improper for application as a manure, until it has been mixed and incorporated with a pretty large proportion of some rich earthy substance with which it may combine. In the attempts which he has had an opportunity of making with this animal substance, after being much reduced, it has always been blended in the proportion of three or four parts of good vegetable mould, according to the condition of the land, to one of the graves, and then sown as a top-dressing on grass land, where it has never failed to produce a full crop of hay, considerably greater than that by the usual dressings of dung, and a rich sweet after-grass, or such as cattle are remarkably fond of feeding upon.

At Enfield, Dr. Wilkinson found, in his trials, that the animal kingdom furnished the strongest manures; among which, graves was the most powerful and durable in its effects. "From one ton to a ton and a half, he considers as sufficient for an acre, according to the state of the land. The cakes, in his practice, were minutely divided, which, on account of their hardness, is an expensive and laborious operation; and that even in this state of minute division, unless mixed with mould, they frequently prove too strong for corn, as he found by experience, on applying them to barley, the grain of which being injured by the rankness of the straw. They are, he conceives, peculiarly adapted to promote the growth of grass, turnips, and the leguminous plants." And it is further stated, that "eight acres of pebbly loam were manured by him with dung, at the rate of ten loads of the common Middlesex carts *per* acre, except one acre of the poorest and most gravelly, which was dressed with a ton and a half of graves. The turnips where the graves were spread, and the succeeding barley, (which were the crops on the whole piece,) were thicker and more vigorous than where common dung had been laid. He has observed grass rendered so rank, by the use of graves as a manure, that cattle would not touch it till mellowed by the winter's frost; and even in the succeeding years he was able to trace, by the superior verdure of the grass, to what extent this manure had been spread. He has also used, with success, salted fish provisions, particularly herrings, which had been spoiled on ship-board, and has found them equal to the graves. In the same manner he has used salt meat, that has become putrid in a long voyage. His general mode of application has been to mix them with mould raised from the head-lands of the field, where they were intended to be spread. By letting them lie for some time, the earth imbibes the strong smell and virtues of the animal manure. Over these he has spread with advantage the liquor drawn from the graves, and the washings of the casks of salted meat, which has been spoiled. When sprinkled immediately

over

over grafs in the fpring, he has alfo obferved this liquor attended with confiderable efficacy in producing a plentiful crop of hay." He adds, that "laft year (1800) he ufed with fuccefs a combination of lime and graves, mixed with mould from the head-lands, in the proportion of about fifty bufhels of lime to a ton of graves. This compofition refembles *fugar fcum*, which confifts of lime and bullock's blood." On the whole, "from the large experience he has had of the benefits arifing from fugar fcum, he thinks this combination of lime and animal matter deferves further inveftigation." On this it may be obferved, that "there can be little doubt but that by combining lime with animal fubftances, they may be rendered highly active as manures, efpecially when applied on foils that have a fufficiency of thofe earthy fubftances, on which they can exert their full influence. In this way they feem frequently to be rendered more active, than when employed in a fimple uncombined ftate: but experiments are perhaps wanting to fully afcertain the utility and beft means of employing fuch matters." It is however further added, that "lime might thus be combined with bones or woollen rags, or with a compoft of earth and night foil, and would certainly greatly facilitate their converfion into manure, as well as render them more active in producing their effects in the fupport of vegetable crops: and by fome of their properties being abforbed by the lime, during the time of their decompofition, and afterwards parted with more flowly in the foil, they may alfo by fuch means be probably rendered more durable and lafting as manures."

It has been ftated by Dr. Wilkinfon, that "the Arabians, who take great pains to improve their lands, are accuftomed to make large pits: they there put in animal fubftances, and cover them with calcareous or clayey earths; and afterwards thefe earths, which of themfelves are fertile, acquire the properties of the richeft manure." He adds, that "he once ordered a heifer, which died in a field at a diftance from his houfe, to be buried in a compoft of lime and earth. He does not affert that this was its moft profitable application; he had, however, no reafon to complain of his compoft." And "Mr. Wright, in his Survey of the Hufbandry of Scotland, he obferves, mentions a compoft of two parts lime, and one part pigeon's dung, to remain mixed until a confiderable fermentation takes place, which is known by the effluvia. Six bolls of this compoft, it is faid, is fufficient for an acre, and will mark itfelf for many years after it has been applied."

There are various other combinations of this nature, which may be fuccefsfully made ufe of for the purpofes of agriculture, when properly made and applied to the foil.

There are ftill other materials of this clafs, that may be employed as manures on land, fuch as the *refufe of glue-makers*, the *cuttings of felt-mongers*, the *clippings of furriers*, the *fcrapings of oiled-leather*, and the *chips or wafte of fhoe-makers*, where they can be collected in fufficient quantities. Thefe, from their abounding in mucilage and oil, their great attraction for moifture, and their being readily foluble in water, contribute quickly to the fupport of vegetation, but are not probably fo durable in their effects upon land as many other fubftances: hence they fhould only be made ufe of with a view to the immediate crop, which, it is believed, is pretty much the cafe in thofe places where they are capable of being obtained in fuch quantities as to be employed for the purpofes of the farmer.

There are alfo of the fifh kind many fubftances that may be applied in this way, as the *blubber*, remaining after the preparation of oil from the whale, and other large fifhes, and different forts of fmall fifh, both of the fhell and other kinds; likewife the offals of fuch animals, where they can be procured in large quantities, as in large towns, fea diftricts, and where they are cured or prepared in great numbers for the market. Thefe may be found beneficial in various cafes.

All "thefe fubftances may be readily reduced to that ftate which is proper for manure, by mixing with them a fmall portion of the carbonat of lime, and afterwards, according to circumftances, a quantity, two or three times more than the whole, of good vegetable mould. Shell-fifh, fuch as mufcles, are commonly applied without being mixed with earthy matters; but this is certainly a wafteful practice, as much of their valuable principles is diffipated and loft, as is evident from the highly difagreeable ftench that affails the neighbourhood of the ground on which they have been applied." By mixing good vegetable mould, fcrapings of ditches, or peat earth with them, the quantity of the manure would not only be greatly increafed, but the offenfivenefs attending the ufe of fuch manures, in a great meafure, corrected, and the effects of them, in promoting the growth of vegetables, probably rendered more extenfively advantageous to the farmer. And the wafte and refufe of flaughter-houfes and butchers' fhops are likewife capable of being prepared and made ufe of in a fimilar manner to that of fifh: but as the manures formed from thefe animal materials are capable of affording much elaftic volatile matters, during their decompofition, they of courfe require to be well mixed and blended with fuch earthy fubftances as they can combine with, and render foluble, and in proportions fuited to their powers, in order to produce the moft beneficial effects on vegetation, and afford the greateft advantages to the cultivator.

The different forts of woollen rags, hair, feathers, and fuch like fubftances, though frequently made ufe of as manures to land, from their having a lefs portion of oily or mucilaginous matter in their compofition, are probably in their effects inferior. Thefe fubftances muft be cut or chopped into fmall pieces, before they can be advantageoufly applied to the ground as manures.

And the author of "Practical Agriculture" concludes, "from the experiments that have been made with fuch animal fubftances as manures, that it may be inferred, that their effects continue longer than thofe of many fubftances of other kinds;" and that they are highly ufeful materials, in many cafes, for being applied to the foil.

It may be noticed, that among the harder forts of animal fubftances, that are capable of being employed as manures, there are confiderable differences in refpect to their texture and firmnefs: fome being quite firm and folid, fuch as bones, horns, hoofs, fhavings of horn, and fome other fimilar fubftances; while others are more foft and pliable. The bones of all animals are capable of affording much nutritious matter to plants; but thofe which are procured from cattle, that have been killed when fat, are faid to be the beft for the purpofes of manure. Thofe which have been boiled are far inferior, in this view, to thofe which have not undergone that procefs, as by fuch means they are principally robbed of their oily and mucilaginous properties, and confequently muft yield much lefs nourifhment to the immediate crop, whether it be grain or grafs. All thefe forts of fubftances require to be ground down in mills conftructed for the purpofe, or otherwife reduced into fmall pieces, before they are laid on and mixed with the foil, or formed into compofts. It is ftated, that "the ufual method is to reduce them to about the fize of large filberts, but that there can be little doubt but that they would fooner run into the ftate of putrefaction, if they were reduced into ftill fmaller particles,

ticles, and thus be made to afford their nutritive properties much more expeditioufly, as well as more abundantly; by which means, much lefs quantities would probably produce equally full effects with the large ones at prefent made ufe of: as, where the pieces into which they are broken are left large, they remain a great length of time in the foil, and are only gradually decompofed, without yielding that full fupply of nourifhment which is neceffary for the fupporting of crops. And when they have been even prepared in this way, too much earthy materials fhould not be mixed with or applied upon them; as, where this is done, by preventing the free operation of the air, their decompofition is greatly retarded. Nor fhould they, upon the fame principles, when intended to be incorporated with the foil, be ploughed in too deeply; as, by fuch a practice, the crop will be deprived of much of the advantages which it might otherwife have obtained from fuch manure."

It is now well known, that "thefe fubftances are conftituted of a confiderable proportion of mucilaginous or gelatinous matter, a flight portion of fat, and an earthy falt compofed of the phofphoric acid and calcareous earth. If great heat be applied, they afford a large quantity of hydrogen gas, carbonic acid gas, and a volatile alkaline liquor. From the nature of thefe different principles, it is evident that fome forts of fubftances may be blended and united with the reduced particles of bony matters fo as to promote their effects, as manures, in a confiderable degree, fuch as lime, chalk, peat earth, and good vegetable mould, in fuitable proportions, as by fuch means new combinations may be formed highly favourable to the procefs of vegetation." And that "the confuming of bony or horny fubftances, by means of fire, for the purpofe of obtaining their afhes, is a wafteful diffipating practice that ought never to be attempted by farmers, as by it the mucilaginous and oily materials are driven off and loft, and nothing remains but a phofphat of lime, which can be of but little ufe in promoting the growth of vegetable crops." Dr. Hunter found, from the application of reduced bones to a poor calcareous foil, with a grain crop in the proportion of 60 bufhels to the acre, that the crop was much fuperior, where this was ufed, to that which had not been dreffed in the fame way, and the grafs crops afterwards for fome length of time, on the fame place, difplayed a fuperiority, and appeared more early. He alfo found the fame fuperiority in turnip crops in different fields, when dreffed in the fame way. Mr. Young likewife found the effects of bone manures to be very great; but they did not correfpond to the quantities employed, as with 25 cart-loads the crop was better than with 50. This curious fact is, however, explained in the opinion of the firft of the above writers, by his obferving that the foil was an extremely poor one, as in fuch a cafe there could only be a fmall portion of earthy matter for the ammonia and other fubftances afforded by the decompofition of the bone to act upon, and reduced to that ftate of folubility the moft adapted to the fupport of vegetation. Hence the immediate benefit that was derived from the manure probably depended folely on the oily and mucilaginous materials that were afforded on their being firft applied.

But where bony fubftances are not broken down into very fmall particles, it is fufpected, from fome few trials that the firft of the above writers has been enabled to make, that the effects of fuch fubftances will be equally, if not more apparent the fecond than the firft year, whether they be ufed on grafs land, or that which is under the plough.

The trials which Dr. Hunter made with ground and unground bones, feem likewife to fupport this opinion, as he found, that for the immediate crop the unground bones were of little or no fervice, but the ground ones of much benefit. What effect the unground ones had the fecond year is not exactly known; however, from his concluding that thefe fubftances are in general, upon grafs land, more effectual the fecond than the firft year, it may be eafily fuppofed to have been the cafe. See Bones.

Manures of the Vegetable Kind.—There are many different forts of vegetable matters, when deprived of their living property, by undergoing the proceffes of decompofition, that foon become proper for the nutrition and fupport of new plants, and fit for being applied as manure. Their reduction into this ftate is greatly promoted by their being expofed to the full influence of the air, moifture, and a fuitable degree of heat. Under thefe circumftances different fubftances are evolved, and new combinations formed that become ufeful in the fupport of vegetation. Thefe proceffes or decompofitions have been commonly fuppofed to fucceed one another with regularity, from that which is productive of fweetnefs, to that which is the ultimate refult of putrefaction. But Dr. Darwin has fuggefted, "that it is more probable that different forts and parts of organized matters, when dead, may undergo many different forts of chemical changes, and that thefe may be different according to the differences in the degrees of heat, the quantity of water and of air to which they are expofed. He was led to this fuppofition from the faccharine procefs preceding the vinous fermentation, which takes place in certain ftates of animal ftomachs; and from what happens in the germination or fprouting of grain, by which the mealy matter is converted into fugar. And from obferving that the acerb juices of fome kinds of fruit are rendered fweet by baking, he conceives that the faccharine procefs may take place in a degree of heat which is about that of boiling water, and that by it the procefs of fermentation may be altogether prevented from occurring. By deftroying or injuring the life of fruits, it is alfo fuppofed, that the faccharine procefs of their juices may be promoted, as is found in many inftances; fuch as the ripening of fruits after being plucked from the trees; their being fooner ripened after being injured by infects, or other means; and after partially cutting, or otherwife injuring the branches of the trees on which they grow; and this, which is termed the faccharine procefs, it is conjectured, may take place either beneath or upon the earth, in the incipient ftate of vegetable decompofition, before the vinous fermentation, and thus afford a very nourifhing matter to plants." And further, that in the vinous, or procefs which commences after the faccharine, carbon becomes united with pure air in a large proportion; and that probably at the moment of their combination, while they are in the form of a liquid, and before they affume the gafeous ftate, they may be taken up by the roots of vegetables. And that, as in the procefs of putrefaction, carbon is not only changed into carbonic acid, but water decompofed, as is evinced by the fmell of hydrogen, it is fufpected that thefe inflammable fubftances may combine with carbon, as in the cafe of hydrocarbonate gas, and thereby become capable of being taken up as food by the roots of plants, without their paffing into the acid or gafeous ftates. The union of azote with pure air, towards the clofe of the putrefactive procefs, by which nitrous acid is produced, it is likewife conceived, may poffibly tend to promote vegetation. This, however, may be promoted from the circumftance of the pure air or oxygen adhering more loofely to its bafe, the azote, in the formation of this than other acids, and on that account yielding it more readily to the abforbent roots of vegetables. But,

 befides

befides thefe means of fupplying the nutrition of plants, as in the decompofition of vegetable fubftances by the procefs of putrefaction, the conftituent principles of the water which they contain are, as has been juft obferved, in fome meafure fet at liberty, and the hydrogen, one of them, uniting with the azote which is afforded by the diffolution of vegetable matters, though not in fuch large proportions as by animal fubftances, forms ammonia, which, from its ready union with fat and oily matters, and thus rendering them capable of being taken up by the abforbent roots of vegetables, may contribute to the fupport of vegetation. And, in fome inftances, where faline, infoluble, earthy matters, or metallic falts are contained in the foils to which manures of this kind are applied, or in which ammonia may be formed, it may decompofe them, and by that means contribute to the formation of other new and lefs noxious compounds, or fuch as may be more capable of contributing to the growth of vegetables." It is added, that there is another fubftance which generally prevails in vegetables, and which is fuppofed to be a fimple material, obtained in great abundance from the recrements not only of putrifying vegetable, but animal fubftances, and calcareous earth, the latter of which is fuppofed to have been of animal origin in the early periods of the world. This matter, it is thought, when met with in the ftate of folution, may be taken up entire by the abforbent roots of vegetables, as well as occafionally formed and elaborated by them. It is therefore probable, that different matters fitted to the nutrition and fupport of plants, as crops, are formed and evolved during the different proceffes and ftages of decompofition of vegetable as well as animal fubftances. But that in vegetable productions the changes are lefs rapid than in thofe of the animal kind, and probably much more varied, according to the various ftates and textures of the particular fubftances; as it is obvious, from numerous facts and circumftances, that the more luxuriant and juicy vegetables are much more readily decompofed than fuch as are dry, and have a ligneous ftructure. Hence it is, that frefh vegetable matters are much more quickly converted to that ftate of decay, which is fuitable for the fupplying vegetable nourifhment, than fuch as ftraw, hay, wood, and other dry materials of the fame nature. It is not improbable, but that fome vegetable matters may yield fome of the fubftances that are taken up by the abforbent roots of vegetables in much larger proportions than others; as it has been found that different forts of grain vary confiderably in the proportions of mucilaginous, and what is termed vegeto-animal matter, which they contain; and that grain, potatoes, carrots, and many other roots of the fame kind, on being confumed in the open air, afford much larger quantities of alkaline falts than hay, ftraw, or wood; it is undoubtedly from thefe and fimilar caufes, that fome forts of vegetable matters, when reduced by means of putrefaction, are found to be fo much more effectual as manures than others, when applied under the fame circumftances, and to foils in every refpect of a fimilar nature and quality. There is likewife a further circumftance to be attended to in fubftances of this nature, which is, that in general, when refolved by the ultimate procefs of putrefaction, they yield larger proportions of earthy materials to the foils on which they are depofited, than moft matters of the animal kind, and confequently add more effectually to the fubftance of the land. And as this vegetable mould, or earth, from various caufes, is conftantly becoming more extenfively and more intimately blended with the other materials of the foils, and, of courfe, forming new combinations, by which fome of thofe matters which ferve for the nutrition of plants are fet at liberty, and brought into the ftate moft proper for being abforbed by the roots of vegetables; it is evident why thofe manures, which are principally compofed of vegetable fubftances, are more durable in their effects than fuch as are prepared from many forts of animal materials.

It is ftated that the fubftances of this kind which are capable of being beneficially converted to manure, are extremely numerous; and confequently fuggefted that "all kinds of green vegetable productions may be employed in this way; fuch as the luxuriant weeds of rivers, lakes, ponds, and ditches, fern, and the refufe of different kinds of garden vegetables. Where green materials of this nature are made ufe of, they fhould always be cut down while in their juicy ftate, juft before their flowers begin to appear, in order that they may be in the moft fuitable condition for becoming quickly putrid, and to prevent the injury that might otherwife be fuftained from the vegetation of their feeds. They are afterwards to be collected into heaps of a moderate fize, and their putrefaction promoted by their being thrown together as lightly as poffible, and the occafional fprinkling them with water, if the feafon be hot and dry: and as lime is found, when applied to vegetables in their green moift ftate, to difengage from them both hydrogen and azote, by the combination of which volatile alkali is produced, it may be advantageous to blend a portion of lime at firft with the heaps, and afterwards add a fuitable quantity of peat earth, or good vegetable mould, for the alkali thus formed to act upon. By this method, the quantity of manure from fuch fubftances may be greatly augmented, and rendered more valuable. But when dry materials, fuch as hay, ftraw of different kinds, fern, and rufhes, are made ufe of, fuch additions cannot be had recourfe to with equal fuccefs, unlefs where much of the dung and urine of animals have been incorporated with them:" their refolution and decay may, however, be greatly promoted by their being kept in a moderate ftate of moifture, and not permitted to be trodden down too much by cattle, or other means in the farm yards, or other places where they are provided. And another means of fupplying vegetable manure, not fufficiently practifed, is that of providing full fucculent crops of green vegetables; as clover, buck-wheat, tares, vetches, fpurry, peas, beans, turnips, and many other fimilar plants, to be turned down by the plough, in order that they may undergo the putrefactive procefs under the ground, and by that means be converted into manure, and fupply the food of plants. "In this practice it is fuggefted as probable by a late writer, that great advantage might be obtained, on the principles which we have juft ftated, by the fpreading of a fmall portion of lime and peat, or rich vegetable earth, over fuch crops, and then rolling them down, that they may be completely turned in and buried by the plough; an operation which fhould be performed as quickly as poffible afterwards, and where the crops will admit of it, in the fummer or early part of autumn, while the fun has the power of promoting the decay of fuch vegetable matters. By this means, it feems probable that the putrefaction of fuch crops would not only be much expedited, but the principles thereby fet at liberty be capable of exerting their influence much more extenfively than where the plants themfelves are only employed, and little additional expence be incurred by the farmer in executing the work."

Where crops of this nature can be turned down, in fufficiently hot weather, to enfure their running fpeedily into a putrid ftate, it is confidered by fome as a better and more advan-

advantageous practice, efpecially where manures of other kinds are fcarce, than that of obtaining it by confuming them by the feeding or foiling of cattle, which, under other circumftances, is certainly an excellent mode, and one which fhould never be loft fight of by the farmer.

Befides thefe there is another plant of the vegetable kind which is capable of being employed as a manure with great advantage, and which fhould never be overlooked where it is within the reach of the farmer. This is fea-weed, (*quercus marina.*) In the management of this fubftance there is confiderable diverfity: "in fome diftricts it is the practice to fpread it upon the land as foon as poffible after being cut from the borders of the rocks on the different fea-coafts, or collected after being left by the tides, and to plough it in: where this method is adopted, it is advifed that as little time as poffible fhould be fuffered to elapfe after the cutting, or collecting of the weed, before it is ploughed down; for as the plant in its green or fucculent ftate readily decays and becomes putrid, if there be any confiderable delay in the performance of the bufinefs, efpecially when the weather is hot, much of its valuable properties as a manure is diffipated, and carried away by means of evaporation, as is fufficiently fhewn by the pungent and difagreeable fmell that iffues from it, on its being thrown upon the land while undergoing the procefs of putrefaction: and, befides, when it is fuffered to become dry and hard before it is turned into the ground, the parts that remain are confiderably longer before they become decompofed, and reduced into the ftate fuitable for affording the nourifhment and fupport of vegetable crops." It is believed to be, on thefe accounts, as well as that of the weed affording but little earthy matter in proportion to its bulk, on its decompofition, that it is found, in general, to be lefs permanent in its effects as a manure, than fome other vegetable matters. Something may likewife depend on the goodnefs and luxuriance of the weed itfelf, and the ftate which it is in when gathered from the fhores, or cut from the fides of the rocks. As in moft other plants, this will undoubtedly be in the moft proper condition for the purpofes of being converted into manure, when cut or collected in the moft fucculent ftate of its growth, before it has become too old. Another method of practice with this weed, is that of collecting it into large heaps, and letting it remain expofed in that ftate to the influence of the weather until it be completely rotten, and in a condition to be put upon the land; but as the plant contains in its compofition a large proportion of faline matters, which, during the ftate of its decompofition, or decay, are brought into activity, it is plain that by fuch a method of proceeding much lofs muft be fuftained, not only from the diffipation of the volatile and more fluid active parts, by the action of the fun and wind, but by the rains diffolving and carrying down the faline materials that may have been formed. When it is not immediately to be applied as a manure, it would therefore feem to be the moft economical and advantageous mode, efpecially where the weed is frefh, to firft blend a portion of quick lime with the heaps, and then have a fufficient quantity of frefh good earth, mould, or other fimilar material, placed beneath them, as well as mixed with and covered over them, in order that the fubftances afforded by the diffolution of the weed may have fomething to mix with and act upon, and be prevented from being wafhed away by rains. In this way, the quantity of manure may be much increafed, and at the fame time its effects rendered confiderably more lafting in the land. It is the cuftom in the iflands of Jerfey and Guernfey, where this weed is extenfively employed as a manure, to cut it in the early part of the fpring, and about the month of July; the firft cutting, in moft cafes, being immediately made ufe of as a manure for barley and pafture lands, and the latter principally converted to the purpofe of fuel, the afhes only being employed as manure. In the practice of confuming the plant in its dry ftate, however neceffary it may be there from the great fcarcity of fuel, the lofs in manure is extremely great, as the quantity of afhes thus produced are very fmall in proportion to the weed which is confumed. Such weed as is collected after having been thrown upon the fhore by the tides, is found to be much inferior as a manure to that which is cut from the rocks and made ufe of in its green juicy ftate. This fhould, therefore, be well attended to where this plant is in ufe.

Another material of the vegetable kind, that may be had recourfe to as a manure, is that of fuch bark as has been made ufe of for the purpofe of tanning leather. This fubftance, when made ufe of in this way, fhould be collected into moderate fized heaps, before it has become dry by too much expofure to the heat of the fun and wind; and then have a quantity of lime mingled with it, and be kept flightly moiftened with water, as by this means its putrefaction and decay may be greatly promoted. When intended to be applied to grafs lands, it fhould be confiderably more reduced towards the ftate of vegetable mould, than when laid on land for the purpofe of fupporting crops of the grain kind. There is another point that ought to be regarded in this material, which is, that as during its decompofition much heat is produced, and many elaftic matters fet at liberty, it would feem as a manure to be more adapted to the ftiff, cold, and heavy foils, than thofe of the lighter kinds; a fact which the experience of agriculturifts has fhewn to be well founded in general.

And mud taken from the bottom of rivers, ponds, and other places where water has ftagnated for fome time, frefh or maiden earth from the borders of fields or other places, and the fcourings of old ditches, are other fubftances that may be occafionally employed with advantage as manures, as being principally compofed of the recrements of decayed vegetable matters. They fhould not, however, be put upon grounds, efpecially thofe in the ftate of grafs, until they have been reduced into a confiderable degree of finenefs, by means of frequent turning over, and the mixing of portions of lime, rotten dung, or other materials of the fame kind, with them, in order to promote and render the decay of the more folid parts complete. In the application of manures prepared from fubftances of this fort, as top dreffings to land, in the ftate of grafs, they fhould not be fpread on too thickly, or in too large proportions at one time, as where that is the cafe great injury is often done to the fucceeding crop, the grafs not being able to fpread itfelf completely over the furface of the ground.

There is another material in the duft which is feparated from malt in drying, mixed with the tails, ufually denominated *coombs*, which, where they can be procured in large quantities, as in the malting diftricts, may be made ufe of for the purpofe of manure. In a paper, by Mr. Farey, in the Annals of Agriculture, it is remarked, that the black malt-duft, fuch as falls through the kiln-plate in the operation of drying, is greatly preferable to the white, on account of the feeds of charlock, with which it abounds, being deftroyed by the heat, and rendered fit for manure. The heat thus applied, by deftroying the vegetative principle of fuch feeds where they exift, probably renders them and the duft more readily difpofed to take on the procefs of of decay and become putrid, and thereby afford the nutrition of vegetables more quickly as well as more abundantly than in other circumftances. It is well hinted by a late writer that "this, as well as faw-duft, where they can be had at a cheap rate, may be confiderably improved as manures by incorporating them, in pretty large quantities, with the dung and urine of animals, as by ftrewing them in the bottoms of poultry and pigeon houfes, dung heaps, and neceffaries; and alfo in the bottoms of refervoirs into which the urine of cattle, and the foap-fuds after wafhing are emptied; from the action of thefe matters upon them, they are found to become more quickly in a ftate to be ufed with advantage as manures." And it is added, that "manures of this fort have been found very beneficial when applied in the proportion of four quarters to the acre, fown with the crop for which it it employed. See MALT *Duft*.

The hufks, or cakes, which are left after different oily feeds, fuch as thofe of rape, cole, &c. have been fubjected to preffure in mills in order to obtain their oil, are other materials that may be converted to the purpofe of manure. Thefe fubftances are generally prepared for application by being reduced into the ftate of coarfe powder, by mills or other fuitable means, and then fown by the hand, and harrowed in with the feed of the crop for which they are ufed. Some farmers, likewife, advife their being mixed, when thus reduced, thinly, with the materials of fuch dunghills as are deficient in richnefs, as where they have been made by lean ftock with a large proportion of litter. On turning over heaps of this kind, about a ton of cake is recommended to be well and evenly incorporated with every twenty or thirty tons of the dunghill compoft; by this practice a rich and good manure is faid to be formed. It is afferted, that "the fuccefs of thefe fubftances, when made ufe of as manures, has been found to depend, in a great meafure, upon the falling of rain foon after they have been put upon the land, as in dry feafons little benefit has been derived from their application." The reafon of this feems to be, according to a late author, "that as the cake when ufed is moftly in an extremely hard and dry ftate, it does not undergo that decompofition which is neceffary, until it has been moiftened by the rain, by which it is rendered capable of running quickly into the ftate of putrefaction, and confequently of affording fuch matters as are fuitable for the fupport of plants." And it is added, that "when applied without being incorporated with any other fubftance, it is moftly laid on to the amount of four or five quarters to the acre, according to the condition of the land."

And there is ftill another vegetable matter found in the refufe or pulp of pears and apples which have been ground, and the liquor fqueezed from them, that may likewife be converted to the purpofe of a manure, in the diftricts where cyder is prepared in large quantities. But it is advifed that fome heavy fubftance, fuch as good earth with a little dung, fhould be mixed with it before it is put upon the foil, as by being blended with fuch materials it may be more conveniently and more extenfively applied to the land, and probably with better effect.

Manures of the Earthy or Foffil Kind.—It is well known that there are a great many different forts of materials of this nature that may be brought into ufe for the purpofe of improving the condition of lands. The chief of the fubftances of this defcription are of the calcareous kind, which are found to "produce effects more or lefs powerful in promoting the growth of vegetable crops, in fome meafure, according to the ftate and quantity in which they are applied, the nature of the foils in which they are employed, and the properties of the matters with which they are combined. For though calcareous materials have been made ufe of as manures for a very great length of time, and have been applied in various ways, difficulties ftill remain concerning the manner of their operation, in many cafes, which feem principally, however, to proceed from the want of proper difcrimination in refpect to the ftate of the different calcareous fubftances at the time of their application, and their being made ufe of to different foils without a fufficient diftinction as to the properties of the materials of which they are conftituted or compofed." The inquiries of a late experimental writer "have likewife fhewn it neceffary to attend to another circumftance, which is, the fubftances the calcareous material is combined with; as he has found that where magnefia is in union with the calcareous matter, it is not by any means fo beneficial for the purpofes of manure and promoting vegetation, as where no fuch mixture or combination is prefent, efpecially when ufed in the fame proportions." This is, however, a point that requires further examination, and which is by no means fully decided. It has alfo been obferved, "that from fand entering largely into the compofition of lime-ftone or other calcareous matter, in fome cafes, as it is a fubftance of much greater fpecific gravity than pure cauftic lime, confiderable differences in its effects as a manure may be produced." On thefe accounts it is concluded, that though lime may be produced from chalk, marble, different lime-ftones, coral and fhells, by fubjecting them to fuch degrees of heat as are neceffary to expel or difengage the carbonic acid or fixed air that they contain, which is apparently of the fame quality, it may vary in its effects when employed for the purpofes of the farmer. See LIME and LIME-STONE.

It is evident that lime, when newly burned, or before it becomes loaded or faturated with the moifture and carbonic acid, or fixed air, contained in the atmofphere, which, from their ftrong tendencies to combine or unite with it, generally foon takes place, is in its great ftate of activity, and from the power which it poffeffes of breaking down and deftroying the texture and organization of fuch animal and vegetable fubftances as come in contact with it, termed *cauftic* or *quick* lime. When, under thefe circumftances, it is applied to grounds which abound either with frefh vegetable matters, or fuch as have undergone fome degree of change, by being buried in the foil, as in moory and heathy mountain-land, peaty or boggy earth, and all fuch foils as have long remained in their original uncultivated ftate, covered with a variety of coarfe plants, it is faid to be "found to produce beneficial effects; in the firft cafe probably by its ready action on the different materials of the green plants, by which it difengages from them hydrogen and azote, from the fubfequent combination of which ammonia or volatile alkali is produced, a fubftance which has great power in promoting vegetation, as is feen in cafes where fubftances that contain this matter in large quantities are ufed as manures; and in the fecond place, by its combination with the carbonaceous matter of fuch foils, or with that of the various animal and vegetable matters which are contained in them, in fome of the ftages of their putrefaction or decay, and by this means rendering it foluble in water, and thereby capable of being taken up as food by the abforbent roots of vegetables." And, "that though lime in its pure or cauftic ftate retards, in fome degree, the procefs of putrefaction, efpecially when ufed in any large quantity, it is probable, that by its power of corroding and diffolving the hard and fibrous parts of vegetable and other matters, as is fhewn by its quickly reducing the ligneous particles of bark, which has been employed in the procefs of tanning, to the ftate of mould, it may bring the abundant vegetable and other materials contained in fuch forts of land quickly into that earthy condition, in which they afford the nourifhment and fupport of crops, which by the procefs of putrefaction, and infect digeftion, could only have been performed in a very flow and gradual manner." Further, from its well-known property of deftroying different kinds of infects, fuch as worms, fnails, flugs, grubs, &c. which are moftly abundant in rich frefh foils, it may furnifh much nutritious matter for the purpofe of promoting the growth of plants as crops. There is, likewife, another way in which it may contribute to the fame end, which is, from its having a greater tendency to combine with mucilaginous oily matters than with fixed alkalies, as a kind of calcareous foap may in fome cafes be formed that may contribute, in its liquid ftate, to the nourifhment of plants, as has been noticed by Mr. Nicholfon, in his Philofophical Journal.

Befides, it has alfo the power, when mixed with clayey foils which do not poffefs too great a degree of humidity, of rendering them lefs ftiff and tenacious, confequently more fuitable for admitting the fmall fibrous roots of vegetables, which is effected, not only by the heat and other elaftic matters that are evolved during the period of its becoming faturated with the moifture and fixed air, or carbonic acid, which they contain, but alfo by being thereby more intimately and minutely incorporated with them, from the fine impalpable powdery ftate to which it is neceffarily reduced. And when in fuch foils the fulphuric acid is predominant, it may alfo produce good effects, by forming with it a kind of gypfeous compound, and in cafes where other acids are prefent that are prejudicial to vegetation, by the power which it poffeffes of neutralizing them, and thus preventing their hurtful effects. And it is alfo further probable, that when burnt from the magnefian lime-ftone, it may prove ferviceable when applied to clayey or other foils that contain the fulphuric acid, ufually denominated four lands by farmers, by forming a fort of Epfom falt in the ground, a fubftance which the experiments of Dr. Home have long ago fhewn to be favourable to vegetation, when laid on ground in fmall quantities.

It is found that this fubftance, on expofure to the atmofphere for fome time, undergoes a confiderable change, being rendered mild by the abforption of the carbonic acid or fixed air that furrounds it. In this ftate of combination, it has been termed, by modern chemifts, *carbonate of lime*, or *effete* lime: in which condition its power of acting upon, deftroying and breaking down the texture of organized matters, is greatly diminifhed. It has ftill, however, the effect of promoting their diffolution by forwarding the natural procefs of putrefaction, as is proved by the compoft dung-heaps with which it has been blended becoming more quickly in a proper ftate to be applied to land, than in the contrary cafes. By this means it confequently contributes much to the fupport of vegetation: and it has been lately fuggefted, that when incorporated with fuch compoft of foil and manure, as are in a ftate of generating nitrous acid, it may arreft the acid as it forms, by which means a calcareous nitre is produced, and thus the exhalation and ready efcape of a nutritious material be guarded againft. It is further conceived, alfo, that the combination of lime with carbonic acid, by rendering it foluble in water in its fluid ftate, without being expanded into gas or vapour, may fupply much carbonaceous matter for the fupport of vegetation. And by the property it poffeffes of fuper-faturating or overloading itfelf with moifture, by attracting or drawing it away from the air, in contact with the furface of the ground and the earth underneath, and after depriving them of it, and the carbonic acid which they contained, permitting them to efcape again, as is evident in the cafe of new plaiftered walls, it may be of confiderable utility when applied to the dry and fandy forts of foil, by affording moifture and fuch aerial matters to the roots of the vegetable crops; which it is capable of fupplying in a very equal and extenfive manner, from the extreme ftate of pulverization to which it is reduced when flaked by the dampnefs of the atmofphere, or by a very gentle fall of moifture. And in addition to thefe modes of promoting the growth of vegetable crops, it has been fuppofed by Dr. Darwin, that calcareous earth, by containing phofphorus, may be ufeful, as by its union with it a kind of hepar may be produced, and the phofphorus thereby rendered foluble in water, without becoming an acid by means of its combination with oxygen or vital air. It is conceived that phofphorus is probably as neceffary an ingredient in vegetable as animal bodies, as is evident, it is fuppofed, from the phofphoric light feen on rotten wood, in fome of the ftages of putrefaction; in which, it is believed, the phofphorus is fet at liberty from the calcareous earth, or from the fixed alkali, or the carbon of the decompofing wood, and acquires oxygen from the atmofphere, both warmth and light being emitted during their union. And it may, perhaps, more frequently exift in the form of phofphoric acid in vegetables, and be thus readily combined with their calcareous earth, or be feparated from its acid by the carbon of the vegetable, during the time of calcination, as well as in the procefs of putrefaction. It is, therefore, plain, from this account of the nature and properties of lime, that it may be made ufe of in one or other of its ftates more generally to foils, than has been commonly fuppofed. But it fhould never be applied without duly attending to the nature and quality of the foil on which it is to be laid, as upon this circumftance, its fuccefs in a great meafure depends in all cafes.

It may be noticed, that the trials that have been made by farmers with this manure, fufficiently fhew, that the more minutely lime is blended and incorporated with the mould of the land on which it is applied, the more full and complete are the effects which it affords in fupporting the growth of different forts of crops. In fupport of this, it has been remarked by Dr. Anderfon, that "if a heap of lime of a confiderable thicknefs fhall have been ever fo long on one fpot, and be afterwards carried clean away from it, fo that none of the particles of the lime remain to be mixed with the foil, that fpot will not be richer, or carry more luxuriant crops, than the places around it; which, every one knows, is not the cafe with regard to dung." And further, that "if lime be fpread upon the furface of the foil, and allowed to remain there without being ploughed in, its effects will fcarcely be perceived for feveral years, till it has had time gradually to fink through the fward, and mix with the foil; after which its effects begin to be perceived, although much lefs fenfibly than if the fame had been intimately mixed with the foil by means of the plough and harrow." The fame writer adds, that he is not a ftranger to the improvements that have been made in Derbyfhire by means of lime, without the plough; but this, he thinks, is no exception to what he has faid. The effects are flow, though certain. "Thofe who inhabit counties that do not admit of the plough, are often advifed to lay lime upon the grafs, and are made to believe that their pafture will be immediately mended by it, nearly in the fame perceptible manner as if it had been dunged. This he has tried, and has feen it tried by others; but always found tnat the grafs for the firft year was rather hurt than benefited by it; nor was it fo much improved in fucceeding years, as if the fame quantity of lime had been applied and immediately mixed with the foil.

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In this mode of applying lime, it is long, he conceives, before it yields a proper return; and is not to be recommended to a poor man, unlefs where neceffity obliges him to practife it." On this fuppofition, it is conceived, that lime may be employed much more advantageoufly when made ufe of, even in fmall proportions, than fuch calcareous fubftances as have been reduced into the ftate of powder without calcination; but much muft depend on the mode in which lime is laid on. "If it is fpread as foon as it is flaked, while yet in a powdery ftate, a very fmall quantity may be made to cover the whole furface of the ground, and to touch an exceedingly great number of particles of earth; but if it is fuffered to lie for fome time after flaking, and to get fo much moifture as to make it run into clods, or cake into large lumps, it can never be again divided into fuch fmall parts; and therefore a much greater quantity is neceffary to produce the fame effect, than if it had been applied in its powdery ftate. But if the foil is afterwards to be continued long in tillage, (as thefe clods are annually broken fmaller by the action of the plough and harrows,) the lime muft continue to exert its influence anew upon the foil for a great courfe of years; it will produce an effect nearly fimilar to that which would be experienced, by annually ftrewing a fmall quantity of powdered lime over the whole furface of the foil: but as the price of the lime muft, in the firft cafe, be paid by the farmer altogether at the beginning, which only comes to be fucceffively demanded in the other cafe, this deferves to be attended to, as it may become a confideration of fome importance where lime is dear, and money not very plentiful."

With refpect to the ufe of lime, there is another point to be confidered, which is, the quantity that may be neceffary. The opinions of practical farmers are much at variance in refpect to this point, fome contending that a fmall quantity can only be applied with fafety and advantage, while others maintain that fcarcely too great a proportion can be made ufe of. It is plain, a late writer thinks, "from the differences that take place in foils, that no particular proportion can be fuitable in every cafe, but that it muft be varied very confiderably according to the circumftances, as well as from the fituation or condition of the land on which it is laid, and the proportion of real calcareous matter that may be contained in the lime that is to be applied. As it has been fhewn that lime, when in its moft active ftate, foon becomes reduced fo as to be perfectly mild by its property of abforbing moifture, and the carbonic acid from the air, there can be little danger of injury from its cauftic quality, though it may, on its firft application, have a tendency to unite with and deftroy fuch green or other vegetable productions as may be prefent." It is, however, the remark of an able farmer, that "moft kinds of *ftone-lime* fhould be applied with a fparing hand, and with a confiderable degree of caution, as the *cauftic* quality is many times greater in *this* than in lime made from chalk." He has had many opportunities, he afferts, of feeing total barrennefs induced by *a too liberal ufe of it;* very generally at the feveral places where the carts were ftopped for the men to fpread it, at the bottoms of every heap, and once an entire clofe.

It is well known that lime has been made ufe of as a manure in different proportions, from one hundred to fix or feven hundred bufhels on the acre, on different forts of foil, by fome under fimilar circumftances, with benefits in proportion to the quantities applied. Befides, accidental experiments in Dr. Anderfon's practice have demonftrated that it may be ufed in ftill larger proportions, with advantageous effects. And he concludes, that "on foils which do not naturally abound with chalk, or other calcareous matter, there is lefs danger in giving too much, than too little, except in thofe cafes where an over-luxuriance is dreaded in the land."

It may be obferved, that the permanency of the effects of this material in promoting the growth of vegetable crops, muft be different, according to the difference of circumftances in the land to which it is applied; the proportion of it that is made ufe of, the kind of crop that is cultivated, and other caufes of the fame fort. But from the facts that have been recorded by practical writers, in refpect to its lafting powers of difpofing lands on which it has been laid to the growth of particular forts of crops in preference to others; of rendering the operation of other kinds of manure, and other methods of culture, more effectual than where it had never been ufed; that it affords ufeful changes in the foils to which it is applied. Of this we have an additional proof in the well-known circumftance of the quality of the grain, from fuch lands as have been limed being much improved, having a thinner fkin, and yielding much more flour than that from ground where it has never been employed; which is fuppofed, by a late writer, to proceed from its containing more ftarch and lefs mucilage, on account of the tendency of the lime to promote the converfion of the latter fubftance into the former, by expediting the ripening of the grain. This is a circumftannce which alfo fhews the utility of this manure in thofe kinds of land that are late in bringing their grain crops to perfection, whether from the nature of their foils, fituations, or other circumftances.

It is obvious that this fubftance, with proper care, may be ufeful on many different forts of land, but in its active ftate it is laid on to the moft advantage on thofe of the moory, peaty, heathy, and other kinds that abound in coarfe vegetable matter. On which account it is, perhaps, that it has been found by experience to be equally, if not more beneficial, on poor than on rich foils; and its requiring to be mixed and incorporated with but a fmall portion of earth or mould, to render it highly productive, is in favour of the fame thing. From thefe facts it may be concluded, that this fubftance, befides being ufeful when blended with foils, in rendering the matters they contain proper for the reception of plants, is beneficial in fupplying fuch materials as contribute to their growth and increafe. See Lime.

Other materials, fuch as lime-ftone, and various hard calcareous bodies, which, without being fubjected to the procefs of calcination by heat, may, in fome cafes, as where fuel cannot be procured to burn them into lime, be beneficially applied for the amelioration of land, as has been fhewn by numerous experiments. When thus ufed they fhould be well pulverized, by fuch mechanical means as can be cheaply performed; much of the advantage to be derived from them probably depending upon their being reduced into a confiderable ftate of finenefs, by which they may be more minutely blended with the mould of the foils on which they are applied, and of courfe act upon and afford nutritious principles more extenfively, for the fupport of crops; and at the fame time render the heavy and more cohefive foils lighter, by being more uniformly incorporated with their clayey and earthy materials. But as fuch fubftances can never be reduced, by any fort of machinery, to the fine powdery ftate to which they are capable of being carried by means of calcination it is probable that, when employed upon land, they will be lefs beneficial in many cafes, than when ufed in the ftate of lime. The fame principle likewife holds good, probably, in refpect to the fcrapings of roads, made with calcareous and other fubftances, which are found beneficial in different inftances, [illegible] [illegible] of them is in the ftate of an extremely [illegible], from the attrition caufed in different ways. It has been fuggefted, by the experiments of an able philofophical inquirer, "that even magnefian lime-ftone is made ufe of in this ftate of reduction, without being converted into lime; it may not be fo friendly to vegetation as that which is perfectly calcareous, efpecially when employed in the fame proportions; a circumftance which may, in fome degree, account for the difference which has been obferved in the utility of fuch fubftances as manures." It is obvious that fuch lime-ftones as contain the largeft proportions of argillaceous earth in their compofitions, when employed in this reduced ftate, muft be the moft proper for the thin light foils: as by that means the depth and texture of them may be increafed to the great advantage of the crops. In the application of this fort of material to land, the farmer fhould be attentive to the ftate or condition to which it is reduced, as well as the nature of the foil, and adapt the quantities as much as poffible to them. See LIME-STONE.

Lime-ftone gravel is another fubftance of this nature, which has been fuccefsfully employed in Ireland; it is a kind of ftony marle, which might probably be equally or more beneficial, in much lefs quantities, by having the ftony lumps which it contains firft more perfectly reduced; as it has been found that where the pieces are large, a much greater proportion is required, and the effects are flower than when made ufe of in a more reduced ftate of powder. See LIME-STONE *Gravel*.

And chalk is another material of the fame fort, capable of producing beneficial effects on land, when applied in a proper manner in its uncalcined ftate. From the portion of argillaceous or clayey matter united with it in fome cafes, it partakes of the nature of marle. It has been ftated that, where it is made ufe of to the more ftiff, clayey, loamy, and heavy forts of foil, it fhould, in moft cafes, be as much pulverized and reduced as poffible before it is laid on, in order that it may be fpread with greater exactnefs, and be more regularly mixed and blended with the ftiff and compact materials of fuch lands; from which they may be rendered more capable of admitting the fibrous roots of vegetable crops to fpread themfelves in them, and thereby take in more perfectly the nutritious matters which are prefented to them." That this is an ufeful practice, is evident from the circumftance of farmers, in moft of the diftricts where chalk is employed as a manure, finding it more beneficial when made ufe of in the fpring, after having been dug up in the autumn, and expofed to the froft and moifture through the following winter, as by that means it is much pulverized and broken down. The advantage of breaking down the large lumps is alfo in favour of the fame opinion. It is ftated by the author of Practical Agriculture, that "it would probably, however, be a ftill more advantageous practice to break it down, and apply it as quickly as poffible, after digging it out of the pit; as by leaving it expofed to the atmofphere for fome length of time, it not only becomes hard, but likewife lefs foluble, and therefore lefs proper for the purpofes of manure. Hence it probably is, that farmers, where the chalk hufbandry is practifed, find the dreffings more efficacious when the chalk is dug from a confiderable depth, than where it lies near the furface of the ground. In the dry and light foils too it may, probably, be more ferviceable in this reduced and powdery ftate, from the circumftance of its poffeffing more moifture, on account of a more extended furface being expofed to the air, and the particles of the foil, from which it may abforb and attract it, and afterwards part with or afford it in a more regular and uniform manner, to the abforbent roots of the growing vegetable crops. The obfervations of practical farmers, however, invariably fhew, that on fuch foils it is much more beneficial when made ufe of in the form of compoft, either with rich peat, or vegetable earth and mould, or with good dung; as by this means a great defect in fuch kinds of land, the want of well reduced vegetable matter, is remedied, and a greater proportion of nutritious materials afforded for the fupport of crops."

But in ufing it upon wet and poachy kinds of ground, there is not, probably, the fame neceffity for its being reduced to a great degree of finenefs, as it may be apt, under fuch circumftances, to diffolve, and fink down too much by being fo greatly diluted with water, while in the rounder ftate it may be retained near the furface, and thereby be capable of abforbing and taking away the fuper-abundant furface-moifture more effectually. In fuch foils, where the principal intention is the deftruction of mofs, rufhes, and other coarfe plants, the growth of which depends upon a great degree of fuperficial wetnefs, it may, however, be employed to moft advantage in a ftate of confiderable reduction, as from its greater readinefs to fink down, it may the more quickly take away from their roots the exceffive moifture that fupports them. When acids exift under certain combinations in fuch foils, it may, probably, alfo neutralize them more readily when applied in its pulverized ftate, than in the lumpy one in which it is moftly laid on fuch lands.

It may be ftated, that the quantity or proportion in which it may be applied, muft depend, in a great meafure, upon the ftate of the foil, the nature of the crop, and the intention with which it is employed. In the fouthern diftricts it is laid on the ftiff clayey foils in large quantities, as from twelve to fourteen or fifteen waggon loads, or from fifteen to twenty hundred weight each, to the acre; and on the fandy foils in fome parts of Kent, at the rate of one hundred and fixty bufhels to the acre. On deep and ftrong kinds of foil, the practice is moftly either to lay it on the clover leys while feeding off, or upon the fummer fallows. And it is frequently ufed in the form of compoft on light foils, to the wheat fallows, as well as grafs grounds. But as it cannot be reduced to the ftate of powdery finenefs of lime, and cannot of courfe be fo equally fpread out, or fo minutely blended with the foil, much larger proportions muft be employed to produce the fame effects upon the foil; three or four times the quantity is in moft cafes requifite. On this account it has been fuggefted, that where it muft be carried from a great diftance in its wet, heavy ftate, it may be the moft economical practice to have it firft converted into the ftate of lime, as it will thereby be much more eafily conveyed to the places in which it is wanted. See CHALK.

There is another fubftance of this nature, in fome forts of marle which may be made ufe of as manure to different forts of foils with great benefit, according to the difference of their nature.

Where fubftances of this kind are laid upon land, for the purpofe of fupporting immediate crops of either corn or grafs, the moft crumbly, or thofe the moft readily reducible into a powdery ftate, are the moft proper; but where they are laid on with the intention only of affifting future crops, or of producing more lafting effects, thofe that are more hard, and lefs difpofed to fall into pieces, may be more advantageoufly employed, the firft of which is fhewn to be the cafe, by the obfervation of practical hufbandmen in marling diftricts, that it does not exert its full effects on the foil until it has been well mixed and incorporated with it by frequent aration, and by the practice of letting it remain fome time on the furface of the ground before it is turned

turned down, from which it becomes much reduced into a powdery ſtate: and the latter, by the circumſtance of the harder ſorts remaining a great length of time upon, or within, the ground, before they are fully decompoſed, or broken and carried down into the ſoil to be blended with it.

It is clear that ſubſtances of this kind produce beneficial effects on moſt ſorts of ſoil in their different forms; the ſhell, ſtone, and thoſe kinds of marle which abound moſt with calcareous earth, or which have ſand in their compoſition, are the moſt adapted to the ſtrong, ſtiff, clayey ſoils, as by the inſinuation of ſuch matters they are not only rendered more light and friable, but a great part of the injurious moiſture which they contain is removed. While thoſe in which clay conſiderably predominates, are found more advantageous in the light, dry, ſandy, gravelly, and loamy ſoils, as by ſuch ſubſtances the defects of lightneſs are remedied, and the neceſſary moiſture in ſome meaſure preſerved. The writer of the Middleſex Report ſtates, that "on the ſtronger ſorts of loamy ſoil, clayey marle will moſtly be improper, as it has much tendency to render ſuch ſorts of land more wet and adheſive, by which they may be greatly injured. Theſe have been found to be the effects reſulting from the application of it even upon a temperate loam, in ſome parts of Suſſex. And, beſides, it is ſometimes apt to bring up coltsfoot, a weed which is difficult to be eradicated."

In reſpect to the quantity or proportion of theſe ſubſtances which is applied, it differs conſiderably in different diſtricts, which in ſome degree depends upon the nature of the ſoils; the heavy, clayey, or loamy, demanding in general a much larger proportion than the light, ſandy, or gravelly ſorts. The average quantity employed may be eſtimated at from about one to four or more cubic roods of ſixty-four yards to the ſtatute acre, according to the ſtate of the marle, and particular nature and condition of the ground on which it is laid. According to the Survey of Lancaſhire, "it may in many caſes be the moſt adviſable practice not to apply too thick a covering at one time, but to have recourſe to light dreſſings more frequently, as by ſuch a method the fertility of the land may be better preſerved and kept up, and the crops be rendered more full and abundant."

It is ſtated in a practical work, that manure of this ſort is employed on lands in a courſe of tillage, as well as in graſs. On the former it is often made uſe of as a preparation for barley, turnips, and other ſimilar crops, or applied upon clover or other new leys, previous to their being ploughed up for wheat; in which modes of making uſe of it, the common practice is to leave it ſpread out upon the ſurface for ſome length of time before it is turned in, in order that it may be well reduced into a powdery form; for the more perfectly the marle is broken down and ſpread out, the more effectual it is found in promoting the growth of the crops. It has been noticed, that in its application in the latter caſe "it is frequently laid on in too large quantities, or left too long in its lumpy ſtate; from both which circumſtances diſadvantages are produced to the growth of the graſs, when either to be cut for hay, or fed off by cattle; as by the former, where the marle contains much of the argillaceous material, a kind of cruſt is formed that prevents its ſpringing, as happens where the ſtiff mud of ponds, and ſuch like manures, are too thickly laid on lands; and from the latter, the graſs is not only injured by the ſmall clods, as is experienced where imperfectly reduced clayey earth is applied, but the effects of the manure are prevented from being fully exerted on account of its not being well broken, and carried down to the abſorbent roots of the graſſes, by the frequent rains that may take place after its application." And that "when employed in large proportions, whether upon the heavier or lighter ſorts of land, a conſiderable ſpace of time appears, from experience, to be required to elapſe, before it can with advantage be had recourſe to again: for if this circumſtance be not properly attended to, or too many white crops be ſucceſſively taken, a very great degree of exhauſtion is ſoon produced, as has been experienced in many of the marling counties of England, and in Forfarſhire in Scotland. Theſe injurious conſequences are, however, found to be eaſily prevented, by adopting the alternating ſyſtem of corn and graſs, or other green crops." And it is further ſuggeſted as probable, "that by taking corn and graſs crops in ſucceſſion, or, after having one or two grain crops, letting the land be laid down for two or three years with artificial graſſes, the application of marle in ſmall quantities might be more frequently renewed, to the great advantage of the farmer, and the improvement of the land. In ſome of the places where this kind of manure is made uſe of, as in Lancaſhire, ſomething of this practice is adopted with much benefit. And when mixed with dung and other ſubſtances, in the form of compoſt, it is generally found capable of being repeated, at ſhort intervals, with the moſt beneficial effects." From theſe facts, the writer therefore concludes, "that ſuch injuries are rather to be aſcribed to the mode of cropping, than to the nature of the manure. Something may alſo, he ſuppoſes, depend on the manner in which it is applied, as it has been found to be more efficacious, when well mixed and incorporated with the ſoil, than where this has not been the caſe; and that, as it has been found highly advantageous in promoting and bettering the condition of the graſs-lands in ſome diſtricts, while in others it has been objected to as injuring them, it is ſtill farther probable, he conceives, that much depends on the ſtate and manner of its being put in or upon lands, and that it is only where it is laid on in a moderate ſuitable proportion, and after it has been well broken down and reduced into a fine powdery form, ſo that it may be very minutely and intimately blended with the ſoil, that its beſt effects can be exerted upon the land.

And the general method of digging it up in the ſummer ſeaſon, and ſpreading it over the ground in its lumpy ſtate, in order that it may be acted upon and reduced by the heat of the ſun, and the froſts during the ſucceeding winter, is a proof of the ſame concluſion. See Marle.

Another uſeful material as manure, is found in the ſhelly ſand, found in beds in the hollows, and other parts of the ſea-coaſt, in different diſtricts, as containing not only calcareous matter, in a ſtate of conſiderable fineneſs, but a portion of animal and vegetable ſubſtances, with a ſmall quantity of the muriate of ſoda or ſea-ſalt; the laſt of which, from its well-known property of promoting the proceſs of putrefaction in animal and vegetable matters, when in ſuch proportions, and that of deſtroying different kinds of living inſects, may contribute greatly to the good effects experienced from it. This is rendered highly probable, from the circumſtance of that which is taken from underneath the water, or from ſuch banks and places as are daily covered by the tides, being the moſt efficacious when applied to the ſoil. The proportion of calcareous matter contained in ſubſtances of this ſort vary very much, according to the particular circumſtances of them. It has been obſerved, that "where the quantity of calcareous matter is large, and in a very reduced or attenuated ſtate, it is by much the moſt valuable; as when there is much ſand amongſt it, a much larger quantity will be required, and the expence of application be of courſe much increaſed." It is conceived that this ſubſtance is "more proper for the clayey or loamy soils than those of the lighter kinds, especially where the proportion of the calcareous ingredient is large. When equally spread, and well incorporated with such lands, it is generally found to produce good effects for a great length of time." And it has been observed by Dr. Anderson, that "a considerable less quantity of calcareous matter, when in this fine state, will have a more sensible effect, than when it is in that of any kind of earthy marle, as it admits of being spread over the ground with greater equality, and of being more minutely and intimately blended with the soil."

With regard to the quantity employed, it must obviously be different, according to the nature and circumstances of the soil, as well as the sand; but twenty tons to the acre is, for the most part, considered as a proper dressing. It is said to be frequently applied on the summer fallows for wheat, and sometimes as a preparation for barley; and may likewise be laid on clover or other leys, before they are ploughed down for grain crops, but in such cases so large a quantity is not requisite. When put upon grass-land, in not too large a proportion, it commonly produces great and sudden effects, the crops quickly becoming very luxuriant." And it is also observed, that such lands as have been treated in this way, when again brought into tillage, mostly produce abundant crops of the grain kind. It has been stated by Dr. Anderson, that "the effects of this sort of manure on the west coasts of the northern parts of the island have been very extraordinary, especially upon the heathy or mossy soils; and it is supposed that such kinds of sand are more common on the east coasts than has been generally supposed from the little attention that has been bestowed by the farmer in such situations to procure it for use."

Although common sand cannot be properly considered as a manure, it is often found useful in the stiff, clayey, and loamy soils, in lessening their tenacity, and rendering them more light and mellow. This substance has been laid upon rough pasture and meadow land, with the effect of rendering the surface more equal, and bringing up a close thick crop of grass with much white clover. In these cases, the quantity should be proportioned to the stiffness of the soils; but the best practice is, not to apply too large a dressing at a time, as injuries may be done where a very large portion is put on at one time.

Manures of the saline Kind.—There are various substances of this sort, when in combination with earthy and other ingredients which are found beneficial as manures in many instances, when properly employed. The materials that are principally made use of in this way are the refuse of different manufactures, such as those of bleaching and soap-boiling, where in sufficient quantities, as in the neighbourhood of large towns, and where such businesses are conducted on an extensive scale. The ashes which remain after the combustion of various green vegetable matters, wood, pit-coal, peat, &c. and some other substances, such as soot and sea-salt, are of the same nature. It is suggested in a late practical work, that "it is probably to the different alkaline principles contained in these substances, from the great facility and power which they possess of acting upon and dissolving the parts of animal and vegetable matters, especially such of the latter kind as have been rendered insoluble by the absorption of the oxygen, or pure air of the atmosphere, from long or frequent exposure to it, and even fossil coal, under similar circumstances, and by this means forming new saline compounds which are soluble, that their beneficial effects as manures are chiefly to be ascribed." And "that as such inert or insoluble vegetable or peaty matters, when decomposed or reduced into a state of solubility by alkaline substances, assume a brownish-red colour, and become insipid; the alkalies, in such cases, must enter into combination, and be neutralized by the acid or acids contained in them, which will be found to be the phosphoric and the oxalic, or acid of sorrel; from which will be formed, according to the nature of the alkali contained in the substance made use of, phosphats and oxalats of potash, soda, or ammonia, which are matters capable of promoting the growth of plants." But, beside their forming in the soils, or the earthy materials with which they are mixed, such compounds as are beneficial in promoting the growth of vegetables, they may be useful in many cases, when properly applied, and used in sufficient quantity, in correcting the acidity, in altering the state or condition of the lands, as by taking away moisture from the surface where it prevails in an over-proportion in meadows and pastures, and thereby supports crops of coarse vegetables, and by rendering the texture of such grounds as are under the plough more open and mellow, consequently more suitable for the reception of the roots of grain, and other crops. But some of these materials, such as the bleacher's refuse, contains vegetable and mineral alkali, in such proportions as render it incapable of being made use of without being previously mixed with other materials. For which purpose, it is suggested, that "fresh mould or peat earth should be procured; and after having been well mixed and blended with it in the quantity of about eight or ten parts of the earth to one of the refuse, a proportion of rotten dung, suitable to the purpose for which the manure is intended, may be added, by which means a good manure will be formed." And the waste of soapers is another substance that may be made use of in the same way; but in this, it is observed, there is a considerable portion of lime mixed with the alkaline matter. The lees, or liquors, which are drawn off after making soap, as containing much alkaline saline matter, may likewise, where they can be procured in sufficient quantities, and at a reasonable rate, be made use of in a similar manner.

All these different substances, when combined with good rich vegetable mould, turf or peaty matters, and made use of as manure, are constantly found to be the most beneficial upon the stiff clayey and loamy soils; as in such sorts of land it is supposed that they probably not only contribute to the increase of the crops, by furnishing such soluble matters as can be readily taken up by their absorbent roots, but, by lessening their stiffness and tenacity, render them more proper for their reception."

In regard to the proportion or quantity of these manures which may be necessary, it must, as in other cases, vary according to the particular circumstances of the ground or soil upon which they are applied, and the views of the farmer in their application. But it is usual to apply them upon lands in a state of tillage, as well as under grass; in the first they are generally either put on in the state of compost, at the rate of about ten loads to the acre, just before the seed furrow is given or sown over the surface, and harrowed in with the grain; in whichever mode they may be applied, it is requisite to have them spread as equally as possible, in order that they may produce their effects in the most extensive and perfect manner." In the latter it is observed, that "though they may in some instances be used alone, it is probably a much better practice to have them mixed with such earthy substances as have been just mentioned before they are laid on the swards, as by such a practice their effects as manure may be rendered more complete and permanent. Upon grass lands they are often used to the amount of from one hundred to one hundred and fifty bushels. And most grass lands are improved by the application of such manures, but especially such as are wet, and disposed to the production

tion of coarse sour vegetables, such as rushes, wild sorrel, and various other plants of the same kind. But the ashes, or earthy saline matters, arising from the combustion of different fresh vegetable products, though beneficial as manures, are too wasteful and uneconomical in their production to be made use of, except in particular instances, as where wood and other vegetable productions are very abundant, and used commonly as fuel. Or where they cannot be readily cleared away by other more advantageous methods, as ten or fifteen parts, and in some cases considerably more, of such materials are dissipated and lost during the process. Where they are in sufficient quantities for this purpose, it is suggested that they may probably be employed to the greatest advantage by being mixed with a good portion of rich vegetable mould, or peat earth, and a quantity of well fermented dung; as, in such a compound state, they are capable of being applied more extensively, and at the same time in the most favourable condition for the support of vegetation. When made use of on the heavy soils, the quantity of ashes in the compost should be much greater than on those of the lighter kinds; they are, in general, the most effectual when applied as a top dressing to grass lands, especially such as are commonly termed sour, or have much tendency to the production of moss on their surfaces." See ASHES.

And peat earth is another substance met with in different districts, which, after being cut and dried by the heat of the summer, is made use of as fuel. By the consumption of this sort of earth in this way, a considerable loss in respect to manure is sustained; as it has been found, that, "in many cases, nineteen parts out of twenty of the material are dissipated and carried away in the process of combustion, which, as it has been shewn, that the inert vegetable or peaty matter, produced by the action of oxygen, or the pure air of the atmosphere for a great length of time, is capable of being rendered soluble, by mixing lime in certain conditions with it, and still more effectually by alkaline saline substances, might have been preserved and rendered useful." However, in Berkshire it is the common practice to dig up peat earth, merely for the purpose of burning it into ashes, in order that it may be used as a manure upon land in various cases.

But as it is only from fresh or green vegetable productions that alkaline saline substances can be obtained when burned, none being afforded by the combustion of dead or decayed vegetable matters, it would seem that the ashes of peat earth seldom contain much saline matter. It has, however, been observed by some, that all peat earths afford alkaline saline matters in a greater or less proportion when burned, and that in some it is from a twenty-second to a thirty-second part of their weight. It is stated, that "the ashes produced from the burning of peat about Reading in Berkshire, which long experience has shewn to possess great fertilizing powers, are asserted to contain no alkaline salts, nor, from the hasty analysis of them which was made by lord Dundonald, was any saline matter, except a small proportion of sulphat of magnesia, or Epsom salt, found. But it is added, that "if the analysis had been more carefully made, and when the ashes were newly burnt, they would most probably have been found to contain a hepar of lime, which is a saline substance soluble in water, while gypsum, the substance to which it returns on being exposed to the air, is insoluble." The fertilizing effects of these ashes may, therefore, it is supposed, probably materially depend upon this hepar, a circumstance which is rendered still more probable from the observation of Mr. Middleton, in the Middlesex Report, that "the hills on each side of the meadows which produce the Newbury *peat-ashes*, consist of chalk, easily dissolvable by heavy rain, which washes it off the ridges down the furrows, ditches, and streamlets, to the low grounds, where, mixing with the floods, it is floated over the meadows, and deposited in the peat. Consequently the peat of this district differs from that of most others, by the quantity of chalk which it contains; and, when dug, dried, and burnt, the fire reduces the chalk to lime, and the rest to ashes. Hence Newbury ashes are a mixture of lime and vegetable ashes; and it is very probable that any common peat-ashes, or the ashes of rough grass land, of turf, heath, furze, ling, wood, &c. produced by the operation of paring and burning, being mixed with chalk lime in due proportion, would be as equally fertilizing as these noted ashes." But it has been suggested, that there is another circumstance that may produce a difference in the saline and other substances contained in the ashes of different peaty earths, which is that of the presence of mineral springs. When, by this means, an over large portion of sulphat of iron, or green vitriol, happens to be present in the peat, the ashes produced from its combustion must in consequence become injurious, or at least much less beneficial to the growth of vegetables, than in cases where such a substance is not present. Its prejudicial effects, according to lord Dundonald, may be corrected by the use of either lime, magnesia, alkaline salts, or dung; but that preference is to be given to magnesia and alkaline saline substances, as they not only decompose the vitriolic salt, but form other saline substances, which are found favourable to vegetation or the growth of plants.

And where dung is made use of in such cases, the vitriolated iron is brought into its metallic condition, and the sulphuric acid, thus set at liberty, enters into combination with the ammonia or volatile alkali formed from the dung, and produces sulphat of ammonia; or, by uniting with the calcareous matter, and the additional assistance of the inflammable, or putrescent matter of the dung, it may be converted into a hepar that may be beneficial to the growth of plants as crops.

Ashes of these descriptions may be used as a manure, either by being harrowed in with the grain-crops, or sown over them as a top dressing after they have come up. In the former case it is advised, that they should be employed in a somewhat larger proportion than in the latter; in which "the best practice is to sow them over the crops before they are grown too high; and if the weather be rather inclined to wetness, it will be the more favourable: the quantities commonly employed in this way are from fifteen to twenty bushels the acre, according to the state or condition of the land. Where laid on grass lands, whether those of the artificial or natural pasture kinds, they often produce great improvements, rendering the grasses thicker, finer, and more close and abundant, often removing much of the mossy matter which infests them. See ASHES.

And peaty substances, in the reduced state of dust, are sometimes made use of with great benefit; but it is suggested by lord Dundonald, that this sort of earth may generally be employed to most advantage by being well mixed and incorporated with such substances as contain alkaline salts, or with alkaline hepars, or by a mixture of sulphat of soda with lime in its active state." It is likewise supposed, that the powdery or dusty matter of pit-coal might, probably, be applied with the same advantage if prepared in a similar manner, and it is capable of being rendered soluble in the same way. And it is further asserted by the same writer, "as the result of experimental trials, that the effects of peat earth, mixed and incorporated with alkaline saline substances, are equal, if not superior, to those from dung, the weight of of each being the fame ;" which, if it be well-founded, fhews the fuperiority of employing peat earth in this way, inftead of converting it into afhes, to be much more than has been already believed to be the cafe. See PEAT-*duft*.

And the afhes obtained from pit-coal, when applied as manures, are found to be ufeful in many refpects ; but it is fuppofed, as they can contain faline matter only in proportion to the quantity of frefh vegetable products that may have been confumed along with them, little of the effect which is produced can depend upon it ; much more, probably, arifes from the portion of calcareous earth which they contain. It is alfo added that "fomething, in many cafes, probably depends on the animal fubftances that may have been occafionally burnt, or afterwards mixed with them, before they are made ufe of as a manure. And that "they may alfo be ferviceable on the ftiffer forts of foil, by rendering them more open and difpofed to admit the roots of growing vegetables." This "feems to be fhewn by their utility in the ftiff clayey grounds, from which brick earth has been dug, and on what are generally termed four lands. On the more tenacious loamy foils, they may operate by giving friability, and at the fame time the calcareous principle, in a fmall degree, where it is deficient, which is further fupported by their having been found from experience to be much lefs ufeful in the poorer forts of land, than thofe that are of a good quality."

It may be noticed, that the application of thefe afhes to ftiff foils, from which brick earth has been taken, renders it fufficiently friable to afford good crops of beans, a fort of plant which, though it grows well on heavy foils, could not be produced on lands fo very ftiff as the bottoms of brick grounds, without thefe afhes. However, except in fuch cafes as the above, this manure is probably beft adapted to grafs land as a top-dreffing, and it may be occafionally ufed in this way to young grain crops in particular cafes.

With regard to the proportion in which it may be laid on, it muft be different according to the views of the farmer, the nature of the crop, and the ftate of the ground, as well as other circumftances. See *Coal*-ASHES.

Another faline fubftance is met with in foot, that experience has fhewn to be of much utility, when applied to land as a manure. It is probable, that the beneficial effects refulting from the ufe of this fubftance depend, in a great degree, on the quantity of alkaline faline matter which it contains ; which by its action on the rich vegetable mould of the foil or earth with which it is blended, may render it more capable of fupplying the nutrition of vegetables ; and it may bring the grofs oleaginous matter of the foot into fuch a ftate as to be capable of folution or diffufion in water, and in that way render it fit to be taken up by the abforbent roots of vegetables. It is fuppofed, that "the earthy matter of this fubftance, as well as that of different kinds of afhes, may probably be rendered more fuitable for the purpofe of promoting vegetation, by their having been expofed to the action of fire, as is well known to be the cafe with clay." The great ftate of finenefs in which foot is found, may, likewife, it is fuppofed, be ferviceable, as by that means it becomes capable of being more regularly and more extenfively mixed with the foils on which it is applied. And it is believed, that "the good effects of moft fubftances employed as top-dreffings depend, in fome meafure, upon this circumftance." It is thought probable, that this fubftance, as containing alkaline falt in a confiderable proportion, may probably be ufed with greater advantage by being well mixed or blended in rich mould, or peat-earth, and by fuch a method the quantity of manure would be greatly increafed. This fhould not, however, be attempted where the deftruction of infects forms any part of the defign of the farmer in its application upon his land.

Soot is a fubftance which is chiefly made ufe of as a top dreffing to grain crops and grafs lands. "On the former it has been found extremely ufeful in deftroying the wire-worm and other deftructive infects. This is probably effected by the bitter oleaginous liquid formed from the union of the alkali and the oil of the foot, impregnating thofe parts of the plants on which they feed, and thereby caufing them to be rejected by fuch infects." It may alfo produce fome advantage in this refpect, by promoting a rapid vegetation, and thereby rendering the texture of the plants, very quickly, too firm to be preyed upon by them, as has been obferved by lord Dundonald. That it is very powerful in promoting the vigorous growth of vegetable crops, is fhewn "by the change which takes place after fowing it over fuch young wheat crops as have a yellowifh fickly appearance, as they frequently put on, in a very fhort time afterwards, the healthy green afpect. On meadow and pafture lands, experience has likewife fhewn it to be highly ufeful, not only by encouraging the growth of a finer fort of grafs, but by deftroying or correcting the frequent difpofition of fuch grounds to produce mofs, and fome other coarfe forts of vegetable productions." In refpect to the quantity or proportion that may be applied, this muft vary according to the circumftances of the cafe ; the moft common quantity is generally from about forty to fifty bufhels on the acre. See SOOT.

It is advifed, where any of thefe or other materials that contain faline matters, are to be employed as manures, that "they fhould always be preferved in fheds, or other convenient places, from rains, or the accidental application of water to them, as where this practice is neglected, the faline fubftances are foon diffolved and carried away in a liquid form. It is chiefly from this caufe, that fubftances of this kind, which have been long expofed without being covered, are often found fo inferior in their effects to thofe which are frefh or newly made. On this account alfo, if fuch fubftances are laid on land at too early a period of the feafon, they will be liable to have much of their valuable properties carried away by the rains that may take place."

The muriat of foda, or fea-falt, is a fubftance, the utility of which has been already noticed, but which, "for the purpofes of manure, feems not yet well afcertained, as by fome it is confidered as poffeffing confiderable powers of promoting vegetation ; while others have experienced little or no advantage from its application. But though it may prevent putrefaction when employed in large proportions by its antifeptic property, as has been fhewn by different trials, when ufed in fmall quantities it has a tendency to promote the procefs. On this account, it may therefore, it is fuppofed, be ferviceable when incorporated with farm-yard dung, and other animal or vegetable matters, in fmall portions."

The author of "Practical Agriculture" has fuggefted, that "as every where in the vicinity of the fea a ready means of obtaining this faline material in unlimited quantities offers itfelf, it may deferve more particularly the notice of the agriculturift ; and more efpecially as many other fubftances that are known to contain, or be impregnated with it, fuch as the weed thrown up by the tides, and the fand over which they flow, can be eafily procured."

There is ftill another fubftance of this nature, that "exifts in the bittern, wafte, or refufe of falt works, which generally contains muriat of magnefia in large proportions. It

It has been found to poffefs very great feptic qualities, and may, therefore, be highly beneficial when mixed with dung, or earthy matters. Experience has fhewn it to be capable of promoting vegetation in a great degree.

The above writer thinks, that "in whatever manner fubftances of the faline kind may produce their effects in promoting vegetation, when employed as manures, it is evident, from their containing in themfelves little or nothing of fuch matters as are capable of affording nourifhment to plants, that they may, in moft cafes, be made ufe of to the greateft advantage, by being mixed and incorporated with fuch fubftances as they are capable of acting upon and reducing to a ftate proper for the fupport of vegetable crops; fuch as rich earthy materials, imperfectly reduced dung, and other matters of a fimilar kind. Where fubftances that contain the muriat of foda, or fea-falt, are employed, they may probably be applied to much advantage, by being mixed with imperfectly burnt clay, when reduced to the ftate of powder. And if upon trial they fhould be found effectual in this form, they may be very conveniently made ufe of in the way of top-dreffings to grafs or grain crops in the fpring."

Manures of the mixed or compoft Kinds.—It is extremely evident, from what has been ftated and explained in refpect to the nature of the different fubftances that are capable of being ufed as manures, that many of them may frequently be mixed and blended with each other, or with materials of other kinds, fo as to be not only confiderably increafed in quantity, but often rendered more effectual and proper for application than in their fimple ftates. At the fame time, it is clear, that fome of them may be thus mixed and incorporated with each other with much more benefit than others; for although the conftant experience of farmers has decicidedly fhewn the great importance and advantage of employing compofts, till lately they have paid little regard to the mixing together of fuch matters as are, from the principles which they originally contain, or which are formed from them, in the changes which they undergo in the different ftages of their decompofitions, adapted to act in the moft fuitable manner for producing fuch combinations or alterations in the materials, as are capable of being beneficial in the greateft poffible degree in promoting vegetation, when applied to the land or foil.

It is obvious, that the manure raifed in the farm-yard is the moft common application of any, and which, from its being formed by the gradual decay of various kinds of vegetable matters, as hay, ftraw, fern, and various other materials of a fimilar nature, with which the dung and urine of animals is incorporated and combined, it is to be confidered as a compound manure. And from the largenefs of the proportion in which fuch vegetable productions enter into its compofition, and the quantity of earthy materials that is in moft cafes added, efpecially where the management is judicious, by laying of fuitable foundations or bottoms, it is lefs frequently requifite to blend it with other fubftances than moft other manures. But as moft of the vegetable materials that conftitute the chief part of it are made ufe of in a dry and hard ftate, and do not fo quickly ferment or run into the ftate of decay, notwithftanding the quantity of animalized matters that may be blended with them; it becomes ufeful to turn them over once or oftener, in order that their complete putrefaction may be promoted, and at the fame time the different materials minutely blended together. And it has been fuggefted, that "in forming of this manure, care fhould alfo be conftantly taken, that the heaps be fo fituated, as that they may not become too dry, or too much foaked in water, as in either cafe they muft be greatly injured," and that "whenever it may be requifite to incorporate any earthy material with this fort of manure, the agricultor fhould carefully attend to the ftate or richnefs in which it may exift in the yard, and proportion fuch additions accordingly." It cannot, however, ever demand a portion nearly fo large as that of fuch manures as are almoft wholly compofed of animal fubftances of fuch earthy matters.

After obferving that ftraw or litter is the bafis of farm-yard manure, or what is often termed dung, a late writer fuggefts that, for light and heavy foils, the dung fhould be prepared in different ways, be ufed at different feafons, and applied to different crops. For light foils, he thinks, manure requires to be much higher prepared than is neceffary for clayey foils; and that every ftep of the previous preparation, to be perfect, ought to be executed in a quite different manner. "For foils of the firft defcription, where turnips are taken as a firft crop, dung can hardly be too well prepared; becaufe the nature of the crop, to which it is applied, renders a complete incorporation with the ground abfolutely neceffary, without which the young plants might be ftarved at their very entrance into life. In the beft farmed Englifh counties, which have come under his obfervation, dung is often kept over year, in order that it may be perfectly rotted: and the late Mr. Bakewell was in habits of not applying it till it was reduced to a ftate fomething like black fnuff." He does not, however, approve of fuch protraction; for, when the preparatory fteps are conducted with judgment, there is rarely any neceffity for keeping dung over year upon turnip-farms; befides, fuch a delay caufes a wafte of the article, and moft likely diffipates its ftrength: at all events, a year's intereft of the value of the increafed produce muft be loft. In general cafes, there is not much difficulty in preparing dung upon turnip-farms; becaufe, in the drieft feafon, from the nature of the food ufed, fuch a quantity of liquid paffes from the animals, as to prevent burning, provincially *fire-fanging*, the greateft obftacle to the rotting of dung that can be experienced. If turnip dung is regularly removed; if it is properly mixed with the horfe litter, and other excrementitious matter accumulated upon the farm, it will be found an eafy tafk to prepare all that is made by the middle of April, at which time the fold-yard fhould be cleared. What is produced after that time fhould be ftored up feparately, receive waterings, if the weather is dry, and be referved for clover ftubbles, or other fields that are to be dunged in autumn." But though the middle of April is mentioned "as a good time for clearing the fold-yard, this does not prevent the work from going partially forward through the winter, when fuitable opportunities occur. When drove out of the fold-yard, the dung fhould be laid up in a regular heap or pile, not exceeding fix quarters, or four feet and one half in height: and care fhould be taken not to put either horfe or cart upon it, which is eafily avoided by backing the cart to the pile, and laying the dung compactly together, with a grepe or fork. It is alfo ufeful to face up the extremities with earth, which keeps in the moifture, and prevents the fun and wind from doing injury. Perhaps a fmall quantity of earth ftrewed upon the top might alfo prove ufeful. Dung, when managed in this manner, generally ferments very rapidly: but if it is difcovered to be in a backward ftate, a complete turn over, about the firft of May, when the weather becomes warm, will quicken the procefs; and the better it is fhaken afunder, the fooner will the end in view be gained." A fecluded fpot of ground, not much expofed to wind, and perfectly fecure from being floated with water, ought always to be chofen for the fcite of fuch

pile•

piles or heaps. If the field, to which it is to be applied, is at hand, a little after-trouble may be faved, by depofiting it there, in the firft inftance; but he has always found it moft convenient to preferve a piece of ground, adjacent to the home-ftead, for fuch a purpofe. There it is always under the farmer's eye; and a greater quantity can be moved in a fhorter time, than when the fituation is more diftant. Befides, in wet weather, and this is generally the time chofen for fuch an operation, not only are roads cut up, by driving to a diftance, but the field, on which the heap is made, may be poached and injured confiderably." This he conceives to be "the moft approved method of procuring dung upon turnip or light farms."

However, "upon clay foils, where wheat forms a principal part of the crop; where great quantities of beans are cultivated, and few turnips fown, unlefs for the ufe of milch cows, the rotting of dung is not only a troublefome, but an expenfive affair. Independent of what is confumed by the ordinary farm-ftock, the overplus of the ftraw muft fome how or another be rotted, by lean cattle kept in the fold-yards, who either receive the ftraw in racks, or it is thrown acrofs the yard, to be eaten and trod down by them. According to this mode of confumption, it is evident that a ftill greater neceffity arifes for a frequent removal of this *unmade* dung; otherwife, from the trampling of the beafts, and the ufual want of moifture, it would comprefs fo much as to prevent putrefaction altogether. To prepare dung fufficiently upon farms of this defcription is at all times an arduous tafk, but fcarcely practicable in dry feafons: for if it once gets burnt (*fire-fanged*), it is almoft phyfically impoffible to bring it into a fuitable ftate of preparation afterwards; and, at all events, its virtues are thereby confiderably diminifhed. The ftraw flung out in confiderable portions to the fold-yard, after being compreffed by the trampling of cattle, becomes rather like a well-packed ftack, than a mafs of dung in a preparatory ftate. The fmall quantity of water and dung made by the animals is barely fufficient to caufe a flight fermentation; and this fermentation, when the heaps get into a compreffed ftate, is fure to bring on the injury of *fire-fanging*. To prevent fuch an injury, no meafure can, it is conceived, be fo fuccefsfully ufed, as a frequent removal of this unmade dung, efpecially if the weather is wet at the time. If people can ftand out to work, you cannot have too much wetnefs when executing this operation; for there is always fuch a quantity of the ftraw, that has not paffed through the entrails of the cattle, as renders it almoft impoffible to do injury, in the firft inftance, by an accefs of moifture. What he would therefore recommend, upon every clay-land farm, efpecially thofe of confiderable fize, is a frequent clearing of the fold-yard; and that the greateft care fhould be taken to mix the ftable or horfe-dung in a regular way with what is gathered in the fold-yard, or made by other animals, in order that a regular heat or fermentation may be fpeedily produced. Where the materials confift of a fmall quantity of dung, or excrementitious matter, and a large ftore of unrotten ftraw, only partially moiftened, he is clear that no damage can enfue from putting horfes and carts upon the heap; nay, he rather thinks that a pofitive benefit will be gained from this flight compreffion. He is, however, at the fame time, well aware that the fentiments of many able and judicious farmers are different from his on this point; they being of opinion, that the natural preffure of the materials is quite fufficient, and that any more is attended with injurious confequences. He is, however, fatisfied, that fuch ideas are unfounded; having tried both methods upon an extenfive fcale, and, from the refults, feels himfelf juftified in recommending the management. Perhaps this difference of fentiment may arife from not attending to the very different qualities of dung on different farms; for he has already fully recognifed the propriety of abftaining from putting horfes and carts upon fuch heaps or piles, containing materials which can be called dung, even though it may be in an unripe ftate. He contends, however, that no injury is fuftained in flightly compreffing a mafs of rough materials; nay, that fuch is attended with beneficial effects: for, if the materials were laid up with a fork, or a grepe, as is recommended in the cafe of turnip or half rotten dung, the fmall portion of moifture therein contained would fpeedily be wafted or evaporated; a circumftance which he has repeatedly witneffed, efpecially when dry weather fucceeded the period when the heap was made up. Befides, driving a one-horfe cart over the furface of materials, only one ftage removed from the condition of dry ftraw, will never prevent fermentation. If left in the fold-yard, he grants that the conftant treading of the cattle therein confined, and the daily increafed weight of the heap, would undoubtedly produce that evil; but fuch is effectually prevented by frequent removals, efpecially if rainy weather prevails at the time. The heap or pile, as in the former cafe, fhould be formed in a fecluded fpot, if fuch can be got at hand; becaufe the lefs it is expofed to the influence of the fun and wind, fo much fafter will fermentation proceed. It fhould be conftructed on a broad bafis, which leffens the bounds of the extremities; and feveral feparate heaps are neceffary, fo as too much may not be depofited at once, which, to a certain extent, would bring on the very evil he has been endeavouring to avert. By fhifting the fcene frequently, and allowing each covering or coat to fettle and ferment, before laying on any more, the moft happy effects will follow; and thefe heaps (all fuch as are completed before the firft of May) may reafonably be expected to be in a fit condition for applying to the fummer fallow fields, in the end of July or firft of Auguft. If the external parts get dry at any time during the procefs, it is proper to water them thoroughly, and, in many cafes, to turn over the heap completely. He may add, that he has repeatedly experienced great advantage from laying a thick coat of fnow upon fuch heaps, as, by the gradual melting thereof, the whole moifture is abforbed, and a ftrong fermentation immediately follows. He would continue the fame method of management during the fummer months, fo far as circumftances permitted; though it rarely happens that dung collected at this advanced period is fit for ufe in the fame feafon, unlefs it be fuch as is made by keeping horfes or cattle in the houfe, upon green food. Perhaps, as a general principle, it is proper to thrafh out all grain before fummer arrives, (a fmall quantity for litter and other purpofes excepted,) in order that the full value of the raw materials, when converted into manure, may be gained. Straw thrafhed in the fummer months always wants a good deal of its original ftrength: it is broken and hafhed by the mills, therefore a large portion muft at once be thrown to the fold-yard, where its ftrength is ftill more exhaufted and diffipated. Even when ftacked carefully, it will be found, next winter, to produce much lefs bulk of dung, than if it had been ufed at the proper time; and intereft of the amount for one year is loft; all which things, added together, will be found equal to one-half of the original worth."

It may be obferved that in cafes where animal matters are thrown together in any quantity, a great increafe of good manure may be made by combining with them, as already mentioned, rich furface mould, peat earth, or the fcrapings of old ditches and roads; as in this way the ammonia formed during the decompofition of the animal materials is prevented

vented from efcaping, as would otherwife be the cafe, and which, by combining with and acting upon the earthy materials, quickly renders them proper for the purpofes of manure. And as fubftances of the animal kind have been found to run very rapidly into the ftate of putrefaction, it has been remarked, that " they may frequently be incorporated with fuch vegetable materials as are little difpofed, or with difficulty made, to rot or become putrid, and by fuch means good compofts be more expeditioufly formed. In making ufe of fuch earthy materials, it may be of much advantage to have them expofed to the influence of the atmofphere for a confiderable length of time, frequently turning them over, before they are mixed with the manures, as by fuch means they become in a more pulverized ftate, and are capable of being more intimately blended with fuch materials, and afterwards fpread over the land with much greater equality, a circumftance upon which their effects very much depend. And that when, in performing this bufinefs, the earthy fubftances are formed into a fort of ridge, about five or fix feet in height, and nearly the fame breadth in the bottom, they will be in the moft proper fituation for being united with dung or other matters that may be intended to be blended with them."

By a late writer it has been remarked, that " lime is a fubftance that has often been too indifcriminately made ufe of in the formation of compofts, but which, by attending to the following circumftances, may admit of being employed extenfively and with more beneficial effects. Where the deftruction or decay of green or frefh vegetable matters, efpecially thofe of the more coarfe and hard kinds, is intended, it fhould be ufed in its cauftic ftate in fmall quantities ; as in this condition, thus fparingly employed, it reduces more expeditioufly the ligneous and hard parts of fuch matters to an earthy ftate ; and as, during its action in this way on thefe fubftances, fuch elaftic matters are fet at liberty, as by their fubfequent combination afford ammonia or volatile alkali, it may frequently be a beneficial practice to blend fuch earthy fubftances as have been juft mentioned with them, and thereby prevent the elaftic matters from being diffipated and loft. If a portion of rich farm-yard dung be fome time afterwards incorporated with the materials, a valuable compoft will be formed." And it is added, that " quick lime is likewife found ufeful, fometimes in bringing the hard parts of dead vegetable matters, as tanners'-bark, fern, ftraw, cabbage-ftalks, leaves, &c. quickly into the ftate of earth or mould ; but whenever it is made ufe of in this way, it fhould be had recourfe to only in a very fcanty proportion to thofe of the matters with which it is mixed, as when it is employed in large proportions, it is liable, from the heat that is extricated or difengaged by its combining with the moifture of fuch fubftance, being fo augmented during its flaking, as to convert them into a coaly fubftance that is infoluble, and at the fame time to force off, in the form of gas, their elaftic principles, except fuch a quantity of carbonic acid as may combine with the lime during the procefs."

It is evident that, " by the common practice of blending quick or cauftic lime with farm-yard dung, much lofs is frequently fuftained ; as by its violent operation upon fuch fubftances, fome of the elaftic matters are not only fet at liberty and quickly conveyed into the atmofphere, but, with what remains infoluble faline, compounds are formed which cannot affift vegetation. It is conceived that the complete putrefaction of fuch manures, when neceffary, is beft promoted by the ufe of lime in its mild ftate. But in cafes where it is " to be blended with peat or earth, the moft advantageous method is to ufe fuch lime as has been newly made and well flaked, in the proportion of about one part of the lime to five or fix parts of the peat or mould, which fhould not be too much exficcated, or dried, before it be made ufe of. By this means the heat which is generated will not be fufficient to produce any injurious confequences, either by forming a coaly matter, or forcing off the elaftic principles in the ftate of gas. And the volatile alkali, which is compofed in fuch cafes, by being allowed to enter into combination, as it is formed, with that part of the peat or mould which has not been acted upon by the lime, in confequence of its being employed in fo fmall a proportion, and in its effete ftate, will form a foluble faline fubftance, capable of promoting vegetation."

Lord Dundonald ftates, that there " are other fubftances that may be ftill more beneficially employed in forming compofts with peat earths, when they can be procured in fuch quantities and at fuch cheap rates as render them capable of being made ufe of in this way," fuch as " alkaline faline matters, or fuch fubftances as contain them in any quantity ; as by mixing thefe with the peaty materials as above, they are made perfectly foluble, while by the ufe of lime only, fuch a proportion of them is rendered foluble, as can be acted upon by the quantity of ammonia or volatile alkali formed during the time it is mixed with them." And ftill farther, that infoluble compounds, fuch as have been noticed, are formed in the latter circumftance.

But the practice common, in different diftricts, of making compofts with lime and mould on the headlands, or other parts of the fields on which they are to be applied, which cannot be done to advantage, except where the furface mould is rich in vegetable matter, is not to be much recommended, but wherever fuch compofts are to be formed, the land fhould always be ploughed or dug up to a great depth, and be reduced into as perfect a powdery ftate as poffible ; frefh lime may then be depofited in fmall heaps, along the middle ridge of the headland, and the earth in this fine ftate be thrown over them, in the proportion of about four parts of earth to one of lime, being kept clofe by being beaten down with the back of the fpade. It is obferved, that from the gradual flaking of the lime in this fituation, by the moifture of the earth, elaftic matters are fet at liberty, which combining with the mould or earth, render it ftill further reduced, and by being afterwards very intimately blended by means of the fpade with the very fine particles of the lime caufed by the flaking, a valuable compoft is made for the ftiffer forts of foil, efpecially if a fmall quantity of good rotten dung be well incorporated with them fome time afterwards.

Although farm-yard manure is feldom in a ftate to admit much addition of earthy matter, yet where there is much liquid oozing from fuch compofts, or ftagnating about the bottoms of them, fome of the earthy materials which have been mentioned may be laid around them in order to abforb or take it up, and prevent the great wafte that muft otherwife take place, as may often be obferved in the fituations where dung compofts are made. And it is advifed, that " this fhould be more particularly attended to, where fuch compofts are laid in fituations that have not been properly formed as dung-fteads." In fuch cafes, it may often be an ufeful practice to place a confiderable thicknefs of fuch materials in the bottoms, before the farm-yard compoft is carried out, and laid upon them, as by that means the manure heap may be greatly increafed, and at the fame time a proper fubftance for the volatile alkali contained in fuch liquors to act upon fupplied. This method is fully confirmed by the practice being in ufe wherever any attention is directed to economy in the forming manures of this kind.

With regard to the application of this fort of manure, the nature of the foil, the ftate or condition of the land,

and the goodneſs of the matters, are circumſtances which render a difference in the quantity of ſuch manures neceſſary. The heavy ſorts of ſoil, ſuch as thoſe of a clayey or deep loamy nature, require compoſts conſtituted of the lighter ſorts of earthy materials; while the thinner and more light ſorts ſtand in need of thoſe which are formed of clayey, loamy, or the more tenacious matters. But "in general, the allowance of ſuch manures ſhould be from ſixteen to twenty loads to the ſtatute acre, each containing ſeventeen or eighteen hundred weight. On many occaſions, however, a much larger proportion may be required, and in others a leſs may anſwer the intentions of the farmer." It is added, that "the mixture of dung and litter, and other materials which are gradually collected and formed into heaps in the farm-yard, is, in general, when employed without having any other ſubſtances incorporated with it, laid on ſuch lands as are under preparation for wheat, turnip, or barley crops. It is likewiſe in ſome places laid on for a pea crop, where wheat is intended to be the ſucceeding crop."

The compoſt manures, which are collected from the ſtreets of large towns, are formed of a great variety of ſubſtances, as the recrements of decayed vegetables, putrid animal matters, and aſhes; but from their abounding for the moſt part with ſubſtances of the latter kinds, they may, on the principles juſt ſtated, be in many inſtances greatly increaſed by having rich ſurface mould or peat earth blended with them; and by ſuch a practice, where the manure heaps are in a condition to admit of it, the riſk of waſte by the eſcape or diſſipation of their more fluid contents in the aerial or gaſeous ſtate be effectually prevented. But ſuch additions can only be advantageouſly made where the proportion of animalized materials in the manure is large; in other caſes it is better to employ them in the ſtate in which they are met with when collected.

It is found that compoſt manures are capable of being uſed with great benefit on different ſoils, and in preparation for different ſorts of grain crops, as well as thoſe of the graſs kind. It is ſtated, that "when applied in the proportion of fifteen or twenty tons to the acre, they generally produce great fertility. They ſhould, however, be applied according to the particular circumſtances of the ſoils, and the nature of the crops for which they are made uſe of."

It may be noticed, that the reſult of practical trials fully proves that the moſt beneficial compoſts are all thoſe which are formed by the combination of earthy materials with animal matters. See COMPOST.

Manures, Means of increaſing and preſerving them.—After what has been already advanced, the beſt means of augmenting, preſerving, and managing manures may be conſidered, as upon this in a great meaſure depends the general fertility of farms, and the goodneſs of the crops that are raiſed upon them. It is of courſe a matter of great intereſt and importance to the farmer to ſee that nothing is deſtroyed, waſted, or thrown away, that can in any way be converted to this purpoſe. It has been remarked by a late writer, "that there are many ſubſtances that may be rendered uſeful in this way, which have hitherto been little regarded by the cultivators of land, there can be little doubt, when the daily waſte of animal, vegetable, and other matters that take place in every country, from their being carried away by rivers, or conſumed by fires, is fully conſidered." By greater attention to the cutting of grain, ſo as to preſerve as much ſtraw as poſſible, as well as care in getting together the ſtubble, in many inſtances vaſt advantage may be gained in this view. And that "another great cauſe of loſs in the production of manures is from the want of adopting or putting in practice ſuch modes of management, in reſpect to different ſubſtances, as are capable of rendering them fit for the purpoſe of application in the moſt quick and expeditious manner; for it is obvious, that if by properly attending to ſuch means, the ſame quantity of manure can be prepared in a ſhort ſpace of time, which under other circumſtances muſt have required a long one, much increaſe of manure may be effected, and conſequently great advantages be gained by the cultivators of the ground." It is ſtated, that what is neceſſary to be done in order to facilitate and haſten the decompoſition and reduction of different materials into the proper ſtates for being applied to the ſoil are, as has been ſeen, "in ſome meaſure, the free admiſſion of atmoſpheric air, a quantity of moiſture ſuited to the condition of the matters made uſe of, and a due degree of heat. And alſo the proper blending of animal with vegetable ſubſtances, in the incipient ſtages, and the addition of the lime, according to circumſtances, and in proportions ſuited to the ſtate and nature of the ingredients."

And in this intention, it is obſerved by the ſame author, "as the principal reſource, on moſt farms, is the farm-yard, it ſhould be conſtructed in ſuch a manner, as that every thing may with eaſe and facility be converted to the purpoſe. In general one dung-ſtead may be ſufficient; but where the ſize of the farm is large two or more may be neceſſary, as the putrefaction of ſuch heaps proceeds with greater regularity and expedition, from the acceſs of air and moiſture being more free when they are not made too large; and, beſides, they can be more conveniently turned over or removed. The parts of the yard on which they are ſituated ſhould, while they are convenient for depoſiting the dung, and other matters from the ſheds and other offices, upon, be neither too much elevated, ſo as to cauſe the dung to become dry, nor ſo greatly depreſſed as to favour the ſtagnation of water upon it, and thereby deprive it of the properties moſt eſſential to the promotion of vegetation. Before each of the dung-ſteads a reſervoir or baſin ought to be made, into which not only the drainings from all the different ſheds and places where animals are fed or kept may empty themſelves, but likewiſe the urine from the neceſſaries, the ſuds from the waſh-houſes, and the waſhings of the various utenſils employed in the family. Without theſe advantages in the contruction of farm-yards, much loſs of manure muſt daily occur from the liquid matters of ſuch places continually running away, and being otherways waſted, as well as from their not being made uſe of to forward the converſion of other ſubſtances into the condition of manures." But that, where theſe and other ſuitable accommodations have been provided, the farmer will have little more to do than "be careful in ſaving or providing ſuch matters as are ſuitable for the purpoſe, and cauſing them to be properly placed and removed, in order to have them ſpeedily reduced into the ſtate of manure, and the quantity of his dung-heaps thereby greatly increaſed and extended. With the ſame deſign, various vegetable matters, ſuch as hay, ſtraw, fern, leaves, ruſhes, coarſe graſſes, flags, and many other aquatic plants, ſhould be collected and preſerved in as large quantities as poſſible, by allowing nothing of the kind to be ſold or carried from farms, except in ſome particular inſtances, as where they are ſituated near large cities or towns, where ſuch articles can be advantageouſly diſpoſed of for the purpoſe of feeding and littering horſes, or other animals, and at the ſame time an equivalent in good manure be brought back to the farm; by mowing and raking together the wheat or other ſtubbles, the fern from the commons, and leaves where they can be obtained, as in the vicinity of parks and other wood-lands, and by cutting the coarſe graſſes

and

and aquatic vegetables at fuch periods as they are in the moft juicy and fucculent ftates. The whole, after being fufficiently dried, fhould be carried to the farm-yards, and ftacked up in convenient fituations, either in or near them, for the purpofe of being made ufe of as litter, and by that means being converted into manure. And in addition to thefe means, every leifure opportunity fhould be taken, before the commencement of the foddering feafon, to bring into the farm-yards fuch quantities of peat or boggy earth, rich furface mould, marle, dry mud from ponds or ditches, fcrapings of roads, loam, and other fubftances of the fame kind, as can be conveniently obtained, for the purpofe of being applied as bottoms for the abforption of the liquid matters."

It is farther ftated, that when fuch materials as are neceffary have been thus procured, "the beft mode of proceeding feems to be that of covering the whole of the yards where the cattle ftand and tread, and even the pig-fties, in fome cafes, with layers of thefe earthy matters, eight, ten, or more inches thick, according to the number of cattle and other circumftances; and alfo to depofit in the refervoirs before the dung-fteads proper quantities of the fame fubftances, for the liquid matters which come into them to act upon. Upon thefe earthy bottoms, at the time the cattle are confined, pretty thick litterings of one or more of the materials that have been collected and ftacked up may be placed, and the ftables, cow and ox-ftalls, pig-fties, &c. cleaned out upon them. Where it is the practice to tie up and confine the cattle in the night-time, the ftraw or other fubftances, after having been broken down and reduced by littering them, may be ufed for covering the bottoms of the yards, by which means their decay may probably be rendered more quick and convenient. It appears alfo probable, that where ftubble, fern, rufhes, leaves, or other vegetable matters, the textures of which are hard and ligneous, are employed, their decay or reduction into the ftate of manure may be greatly expedited by means of a flight portion of lime, in its active ftate, being fpread over the earthy bottoms before they are applied, as has been found to be the cafe with tanners' bark." And that, "where the matters made ufe of in the way of manures are liable to be rendered too dry by the weather, their putrefaction and decay may be much promoted, by having them fprinkled over occafionally with water, which may be conveniently and readily performed by having a pump with troughs fixed properly for the purpofe; or where thefe are wanting, from a pond in the yard." And in order "to render the plan the moft effectual it is capable of, the whole of the cattle fhould be ftrictly confined to the fold or foddering yards during the winter, and not turned out, as is frequently the cafe, into the paftures, by which the making of much manure is prevented, great injury in many fituations done to the grafs-lands, and the ftock, from being much expofed to cold and other caufes, benefited in a far lefs degree than is commonly imagined. By purfuing this method, from the great confumption of ftraw and the coarfer forts of food by the young lean cattle, and of hay and luxuriant vegetable roots of plants by the others, fuch quantities of animalized matters are voided, as by mixing with the bottoms of the yards haftens their putrefaction, and affords not only an immenfe increafe of manure, but of fuch as is of a very valuable kind. If there be not a fufficient proportion of animal dung and urine incorporated with the other matters, which can feldom be the cafe where the cattle are not regularly confined to the fold-yards, the manure, though it may be nearly as large in quantity, is found by experience to be very inferior in its effects when applied to land." It is likewife ftated, that "where the number of cattle confined in the fold-yards is great, it may be neceffary, occafionally, to remove the bottoms, and the matters littered upon them, to the dung-fteads, after they have become in fome degree manures, by being well faturated and blended with the urine and other animalized matters. Thefe muft be immediately replaced by others in the way juft noticed. And farther, "the earthy fubftances from the refervoirs fhould alfo be occafionally emptied out upon the dung heaps, and replaced by quantities of frefh materials of the fame kinds, and the ftems of different grofs vegetable products from gardens or other places."

Befides, "at the clofe of the feafon, when the cattle are turned out of the yards, the heaps of manure which have been thus collected and thrown together, fhould be turned over, in order that the animalized matters may thereby not only be ftill more intimately incorporated with the earthy fubftances, but, likewife, that more of the pure air of the atmofphere may be retained among the clods, from their being rendered much fmaller by fuch means, and the putrefactive procefs be thereby more perfectly produced." And, "after this bufinefs has been well performed, as little delay as poffible fhould be fuffered to take place before the manure is applied to the foil; as, from the combination of oxygen or pure air with the carbonaceous material of the dung, and of azote with hydrogen, under thefe circumftances, fuch fluid matters are formed as conftitute its moft beneficial properties, but which are afterwards continually wafting, fo long as it remains unapplied to the ground or foil." Hence, "on thefe accounts, as well as thofe which have been already ftated, manure heaps fhould not be made too large, but of fuch fizes only as that they can be expeditioufly turned over, and put upon the land. And another advantage which attends the having different heaps, and their not being large, is, that one can be prepared and carried away at a time, without the other's being in the leaft injured by any delay that may happen from unforefeen caufes of any kind."

It is noticed in an ufeful periodical work, that "in many fituations where the above-mentioned articles are plentiful, they are fuffered to go to wafte, though they may be ufed to great advantage for littering the ftables and fold-yards. Ferns and rufhes do not rot fo foon as ftraw, but make a rich manure, and if well turned over in the fpring, are fufficiently rotten in June." In winter and fpring, when dung is taken from the ftable or fold-yards to the fields, it is conceived better to throw it up with forks than allow the carts to be taken upon the dung-hills, a practice which prevents a fpeedy or complete fermentation. At thefe times, the quantity of manure may be much increafed by mixing with the dung large quantities of rich earth, taken from old dykes, fediments of ponds formed by running water, and fuch other places as were moft likely to afford it, well mixed with frefh or diffolved vegetable matter." But it is well obferved, that the practice of mixing earth with dung requires to be managed with a delicate hand, efpecially in forming a dunghill with materials that have not been previoufly fubjected to fermentation, for, as in carting upon it, by preffing and confolidating the mafs, it greatly retards, and, in fome inftances, almoft entirely prevents, fermentation; indeed, by mixing any confiderable quantity of foil with dung in an unfermented ftate, by preffing the ftraw and other matters into a fmall fpace, it fo effectually excludes the air, that the dung, at the diftance of feveral months, is found in a ftate very little different from what it was when put in the heap; and, after all, when it is in common language faid to be rotten, it is, upon examination, found to be only decayed, and the produce, in place of abounding in rich mucilaginous fubftances, ſubſtances, which all well-fermented dung does, is found to conſiſt almoſt entirely of vegetable earth. There is, however, it is ſaid, a mode of applying earth to dung-hills, that is not only ſafe, but highly beneficial: "It conſiſts in covering the whole ſurface of the dung-hill lightly, either with common earth or broken peat, every time the ſtables or fold-yards are emptied; a covering of that kind not being heavy enough to preſs materially upon the maſs, does not retard the fermentation, and has the great additional advantage of preventing the loſs daily ſuſtained about moſt farms by evaporation, and the diſſipation of the greateſt part of the valuable gaſſes generated during the proceſs of fermentation, all of which are entangled and retained by the earth; which, by that means, not only acquires high fertilizing powers, but renders the dung more valuable." And that "when a proper ſyſtem is followed of carrying out the manure from the ſtables and yard to the dung-hill—as once a month, if it is ſpread equally over the whole, and a covering of the kind juſt mentioned laid above it, a conſiderable addition may be made to the quantity of manure upon every farm yearly, not only without riſk, but with very great advantage." This ſort of manure has been found upon light gravelly hills, or fertile clays, particularly uſeful. It is ſuppoſed that "the rich earth alone would no doubt have very much improved ſuch ground, but by being mixed with dung, it probably became impregnated with ſomething of a fertilizing nature, which would otherwiſe have been loſt." In ſome caſes, "inſtead of mixing as above, the earth has been occaſionally laid on a foot or two deep, as a foundation to build dung-hills upon; at other times in ſituations where the drainings of fold-yards, or the urine of fat cattle, could eaſily be conveyed into it, and no doubt conſiderable advantages may be reaped from theſe methods of increaſing the quantity of manure. In regard to the propriety of uſing rotten or rank dung, the latter is ſuppoſed very improper management, though purſued by ſome farmers, who do not wiſh to haſten putrefaction by leading out and turning, not only becauſe theſe operations are troubleſome and expenſive, but becauſe they believe that the quantity of dung is thereby leſſened. They certainly leſſen the bulk, but probably not the quantity of good manure. Perhaps they prevent the loſs of ſome very fertilizing particles, which are exhaled by the ſolar heat, or otherwiſe injured by the weather, when the dung is applied in its rough ſtate, and conſequently not properly covered in. There can, however, be no doubt of a ſmall quantity of rotten dung making land more productive than a much larger one of ſuch as is rough or half rotten.

And it is believed that, "by mixing lime with manures compoſed of earth, and dung in the more advanced ſtages of their preparation, ſome increaſe of quantity may likewiſe be produced; and at the ſame time, by its uniting with the nitrous acid during its formation, may prevent that ſubſtance being thrown off into the atmoſphere in a gaſeous form, or readily waſhed down from the compoſts by rains; and thereby preſerve a material that has long been found uſeful in promoting the growth of plants."

As great waſte of manure is continually taking place from the evaporation of the more liquid parts of manure heaps, where they are much expoſed to the influence of the ſun or winds, and the waſhings of the rains, it would tend greatly to the ſaving of ſuch matters, and at the ſame time conſiderably promote their complete putrefaction and decay, to have them placed in ſituations that are much ſhaded by trees or other means. It is ſuggeſted, that, in farm-yards, moveable coverings of ſome light kind of material might probably be highly advantageous for this purpoſe. By means of this nature, the manure heaps, in ſuch places, may be effectually ſcreened from the action of the ſun in the ſummer, and prevented from being injured by the heavy rain or ſnow that falls in the winter ſeaſon. And as a further inducement to adopt ſuch methods, the manures which have been preſerved from the effects of the weather in this way, are ſaid to have been found, by practical trials, to be far more efficacious in promoting the growth of crops, than under other circumſtances; and of courſe capable of going much further in their application to ſoils.

In order to procure manure from the articles of food and other matters produced on the farm, different modes have been purſued in different ſituations. Some have ſtrenuouſly contended, that the moſt advantageous plan is to have the whole of the hay and ſtraw conſumed by the different animals, without employing any of them in the way of litter, floors or ſtandings for them being conſtructed in ſuch a manner, as that they can be tied up, and kept clean and dry merely by ſweeping, without being littered with ſtraw or other ſimilar materials; while others maintain, on the ground of actual experience, that the method of eating the hay by the ſtock, and employing the whole of the ſtraw, as well as other matters, in the way of litter, is by much the moſt certain and effectual in promoting the increaſe of manure. On theſe different opinions, it has been obſerved, that "though each of the methods may be practiſed with more or leſs advantage, according to the nature of the farms;—as where there is much graſs and little tillage land, the former may be preferable; but where the quantity of graſs is ſmall, and that of arable ground large, the latter;—it is probable, that a judicious combination of both may be the moſt beneficial, eſpecially where, in addition to the common articles, coarſe vegetable and rich earthy matters are provided, and made uſe of in the way which has been mentioned, as by ſuch a combination the full effect can only be produced. In the former method, the loſs by means of digeſtion and animalization is probably much greater than has been generally ſuppoſed by thoſe who have maintained the ſuperior utility of the practice."

In the ſoiling of horſes, and different kinds of cattle, with rich green food, as clover, lucern, ſummer tares, and other artificial graſſes, cut freſh every day during the ſummer ſeaſon, and placed in cribs in the ſheds or foddering-yards, the bottoms or floorings of which have been prepared and ſtrewed with earthy materials and litter, in the manner already directed, there is another way of making great additions to dung-hills, as the evacuations of cattle fed in this way are very conſiderable. The earl of Dundonald has ſuggeſted, "that experience only can teach or warrant the belief of how few acres of ground, under the culture of artificial graſſes, when cut green, and daily given to working horſes and other cattle, will ſuffice for their maintenance. The artificial graſſes, or plants beſt adapted to this purpoſe, are, he ſuppoſes, red clover, tares, and ſaintfoin. None of thoſe ſucculent plants with large ſtems and leaves anſwer ſo well to be depaſtured as to be mown; not only on account of the injury they receive in being bruiſed by the treading of cattle, but, by being conſtantly cropped and kept ſhort, they are deprived of the nouriſhment which they principally receive by their ſtems and leaves. Saintfoin is, he thinks, beſt ſuited to chalky or dry ſoils, and to the ſouthern parts of Britain. It has often been tried without ſucceſs in the northern parts of England and Scotland. Winter tares have alſo been ſown, but have not been found to anſwer any valuable purpoſe. Clover and ſummer tares, therefore, ſhould be the only plants of which the cultivation on a large ſcale ſhould in theſe parts be attempted; and every prudent farmer will take care to have a full ſupply of them, as in the

event

event of a ſuperabundant quantity for green food, theſe crops are equally proper for hay. Tares ſhould always accompany the culture of clover, to ſupply the deficiency of herbage between the firſt and ſecond cuttings of the clover."

And "the quantity of manure that may be formed in this way is, probably, much greater than can be ſuppoſed by thoſe who have not actually made a trial of the method. By ſome French writers it is ſtated, that from three to four hundred ſheep, kept in this mode, manure ſufficient for nearly an acre of land may be daily procured; and the manures, thus obtained, are likewiſe aſſerted to be preferable to dung procured in the common method." It has likewiſe the advantage of preventing the great waſte that unavoidably muſt take place in feeding off ſuch crops, and of bringing the whole of them immediately into uſe: beſides, the manure, thus produced, becomes of a ſuperior quality, from the vaſt quantities of worms and other inſects that are generated during the hot ſummer weather, where it is going on to any great extent.

And the author of "Practical Agriculture" ſtates, that "by means of covered ſheep-folds, a great increaſe might alſo be made annually to the ſtock of manure. If this neglected, but highly beneficial, practice were regularly employed here, as is the caſe in many other countries, by having proper ſheds and incloſures for the purpoſe, conſtructed of any ſlight materials near to the fold-yards, or other more convenient places of the farm, ſo that the ſheep might have freſh air, and ſufficient liberty to run about, and, at the ſame time, have the means of being ſheltered from rain, ſnow, and the coldneſs of the winter ſeaſon, the advantage to the flock would likewiſe be conſiderable, beſides the great ſupply of manure that muſt be provided. In order to promote the latter advantage, the bottoms or floorings of ſuch ſheds and incloſures ſhould be covered with ſuch earthy materials as have been recommended for the cattle yards, and alſo littered upon in the ſame manner; all of which ought to be removed and cleared away to a heap, or the common dung-ſteads of the farm-yards, as often as they become perfectly ſaturated and blended with the dung and urine of the ſheep, and freſh materials of the ſame kind ſupplied. In bad weather, it will be advantageous to keep them conſtantly in the covered folds, and feed them with hay in ſtanding racks; but when it is fine, they may be ſuffered to go into the paſtures in the day-time, and only be put into the folds during the night." It is added, that "the practice of keeping ſheep in covered folds is made uſe of in Flanders, for the purpoſe of raiſing manures, with great ſucceſs; and very dry ſand is ſometimes employed for the bottom of the folds, inſtead of litter." And that, "where the houſe-lamb ſyſtem is carried on to any extent, the preparing and littering of the ſheds and yards, into which the ewes are occaſionally put, and the lambs kept and ſuckled, might be practiſed with great advantage, in reſpect to the production of manure; as animals, under ſuch kinds of management, are conſtantly found to void urine and dung in much larger quantities than in the ordinary courſes of feeding." Where deer are kept, the ſame management may likewiſe take place, and much good dung be raiſed. See *Sheep*-Fold.

The ploughing down of full rich green crops of different kinds, in their moſt ſucculent ſtates, is alſo another means of increaſing manure, that may occaſionally be adopted with great advantage.

And the practice of feeding off different green crops on the land by ſheep, bullocks, or other animals, is another method by which much fertility may occaſionally be given to the ſoil at a cheap rate, as the expence of carriage is prevented, and a conſiderable ſaving of manure effected. Mr. Middleton ſtates, that, by this mode of management, the great loſs of urine and dung, that unavoidably occurs in the other methods, may be moſt effectually prevented; "for in the ſtables, cow-houſes, ſheds, fold-yards, and dung-hills, even under the beſt management, there is a great waſte, perhaps of half, including dung and urine: under ordinary management, three parts of this manure is loſt; but in the ſoiling of tares, turnips, cole, clover, &c. in the fields, there is *no* loſs; the whole is immediately applied, without the coſt of carriage, to the enriching of the ſoil." In this way there muſt, however, be much more waſte than is here ſuppoſed: by evaporation, from the action of the ſun and wind over ſo extenſive a ſurface, much of the valuable matters of the manure, in ſuch ſituations, muſt be daily carried away; and the more fibrous or ligneous parts of the materials, which are rejected as food by the cattle, from their being thinly ſcattered over a large ſurface, become dry and hard, and muſt be longer before they decay, or are rendered fit for the purpoſes of manure, than where they are collected together in large quantities, and in more confined ſituations.

Another mean of increaſing manures to a very great extent, is by adopting ſuch methods as may effectually prevent the ſoil and urine of privies, and the various animal and vegetable materials that are continually thrown into them, in cities and large towns, from being uſeleſsly retained in deep pits, or places conſtructed for the purpoſe, or inconſiderately waſhed away and waſted, by being conveyed into rivers or ponds by ſewers and drains. Mr. Middleton has ſtated, that, from want of ſuitable modes of preſerving ſuch ſubſtances, the annual loſs, in this country, is probably not leſs than five millions of cart-loads, which, if turned to the uſes of agriculture, would be worth to the cultivators of the ſoil two millions and a half, and to the community five millions of pounds ſterling! And the eagerneſs which is manifeſted in many other countries to preſerve and promote the increaſe of ſuch manure, ſhews that it is a ſubſtance of vaſt utility, and that an abundant ſource of fertility is thus neglected, and loſt to the public. It is ſuppoſed, by a late practical writer, that "the moſt eaſy and convenient methods of preſerving ſubſtances of this kind, in the country, would be, probably, by having pits formed for the reception of them, as near as poſſible to the dung-ſteads in farm-yards or other places, and prepared with floors of clay, or ſome other material, through which the liquid matters could not readily paſs: theſe might be connected with the privies by proper drains, and have covers fitted to them, in order that a quantity of mould, peat-earth, ſaw-duſt, lime, ſtems of coarſe garden plants, or other ſubſtances of the ſame ſort, might be occaſionally placed in them, and removed to be blended with the common dung heaps, as often as they become fully reduced by putrefaction, and well ſaturated and impregnated. But in large towns or cities, where ſuch manures are produced in great quantities, reſervoirs or baſons of large ſizes ſhould be conſtructed with floors of the above kind, and be connected with the privies of different parts, by means of ſewers or drains. Such reſervoirs ought to be ſo ſituated as to be capable of being emptied with eaſe and facility, as often as neceſſary, by perſons appointed for the purpoſe, and their contents carried away in the night-time. Where there is the convenience of rivers, however, as in London, and many other populous cities and towns, a large proportion of ſuch manures might, in moſt caſes, be readily emptied from baſons of this ſort, formed on their banks for the purpoſe, pole, or perhaps from the extremities of the common fewers themfelves, by means of proper fluices, into covered boats or barges, and thus cheaply carried to a diftance, for the advantage of agriculture; a method, in fome refpects, practifed with fuccefs in Sweden See Communications to the Board of Agriculture, vol. i.

But "as this kind of manure is extremely liable, from the agitation of the carriage in which it is moved, to become fo liquid as to be conveyed with great difficulty, it is probable that, by having fuch earthy or other fubftances as have been mentioned above, or as could be conveniently procured in fuch large cities or towns, fuch as the long littery dung from livery ftables, lime rubbifh from the pulling down of old houfes, and the frefh earth dug up in preparing the foundations for new ones, mixed and blended with it in the pits or refervoirs, for fome time before they are cleaned out, the difficulties attending the carriage of it might not only in a great meafure be obviated, but the difagreeable fmell iffuing from it be much corrected, and the quantity of manure greatly augmented. By fome method of this nature, under the management and direction of proper perfons, vaft ftores of fertility might, it is conceived, be provided in fuch places for the neighbouring diftricts, which inattention or popular prejudice at prefent withhold from the ufe of agriculture." See NIGHT-SOIL.

Befides, in particular fituations, as near the fea, where fhell and other fmall fifhes can frequently be procured in large quantities, by having them well mixed and incorporated with good furface mould, turf, or peat-earth, or other matters of that fort, a vaft increafe of good manure may alfo be provided. The weeds cut from the fides of the rocks, and which are thrown up by the tides, when collected into heaps, and mixed with fmall proportions of lime and fuitable quantities of mould or earth, may likewife contribute greatly to the increafe of the compoft heaps in fuch diftricts and fituations.

Another material, capable of augmenting the manure heap very much, is the rich vegetable mould, and other matter, contained in the bottoms of ditches, and in boggy, hollow places, where water frequently ftagnates, and large crops of aquatic or other plants alternately vegetate and decay. This fhould be occafionally dug up and applied to the foil, for which it is proper, either in the ftate in which it is found, or after having been formed into compoft heaps with dung, lime, or other fubftance of a fimilar nature.

And clay, though not actually a manure, is a fubftance that may alfo be employed with great advantage on fandy and other light foils, and by that means fave the more valuable manures. It has been made ufe of with great effect in its crude ftate, in the practice of an improving Suffolk farmer, but it would feem to be the moft ferviceable for this ufe after being imperfectly burnt in clamps and kilns, probably from the production of oxygen or pure air that is thus combined with it, or with the metallic matters which it contains. It is well remarked, by a late writer, that "it is neceffary, in order to increafe the ftock of manures on farms to the greateft poffible extent, to be careful that none of fuch animal or vegetable fubftances as are capable of being converted into manure, be thrown away or confumed by fire, but that they be all conveyed to the dung-fteads in the farm-yards or other places, or laid in heaps of themfelves, and fuffered to pafs into fermentation, by which they may be fpeedily reduced to manure. Where the matter thus made ufe of chiefly confifts of weeds and the ftems or roots of coarfe plants, fuch as peas, beans, cabbages, docks, nettles, &c. their decay may be greatly promoted by a little quick-lime being blended with them. Such heaps fhould alfo be covered over pretty well with fome of thofe earthy matters that have been mentioned above." It is added, that as "the different materials which are made ufe of for the purpofe of manure, pafs through different ftages of decompofition and decay, in each of which fuch matters of the folid or fluid kinds are formed, as are capable of contributing to the nutrition and fupport of vegetable crops, but which are liable to be diffipated or carried away by the agency of various caufes, it may be neceffary to guard againft fuch wafte by keeping the dung-heaps covered in every fituation, as much as poffible, with earth or foil, both in the early periods in which heat is evolved, and at the latter ones, when ammonia or volatile alkali is formed; as by fuch management the procefs of decompofition, when too rapid, may be reftrained, and the elaftic matters that are gradually fet at liberty be abforbed by thefe coverings, while the more fluid ones are detained by the earthy bottoms on which they had been placed, and thus the whole of the valuable properties of the manure be preferved."

MANURE, in *Gardening*, a term ufed to fignify all fuch fubftances or materials, whether of the dung, compoft, or other kinds, as are ufeful in the improvement of garden ground, fo as to produce good vegetable crops of various kinds.

It is obvious that materials of this kind are neceffary to all foils to recruit them when exhaufted by the growth of vegetables, and cure their defects; being thus beneficial in enriching and fertilizing fuch as are poor, and in rendering fuch as are ftrong or ftubborn more light, loofe, and friable, as well as thofe which are very light, loofe, and dry, more compact and moift, and thofe that are too wet, drier, &c. In thefe views moift ftiff land is the moft improved by light manures, which open and loofen its particles; very light land by the more heavy and moift forts; and wet land by dry light compofts. Some garden foils alfo require manure annually, and others only once in two or three years. See DUNG, &c.

On the whole, the moft proper forts of manure for the ufe of the kitchen-garden are thofe of the ftable, cow, fheep, pigeon dung, foot, lime, loamy marle, fhell marle, fea-weed, wood, whin, fern, and coal-afhes; the vegetable mould of decayed tree-leaves, and decayed vegetables of all kinds, as cabbage leaves, haulm, weeds, &c. And to thefe may be added the fluid fubftance which drains from dunghills, which is capable of affording the nutrition of plants in a very high degree, from the large proportion of carbonaceous matter with which it is loaded.

All thefe feveral materials may be applied either in a fimple or compound ftate; but the latter method is probably in general the moft eligible; as it is fuppofed by fome, that if they have not undergone a proper degree of fermentation, they have the effect of giving a rank and difagreeable flavour to fome fruits and vegetables; and when a large quantity is applied, of producing a confiderable degree of unwholefomenefs, tainting the juices of the plants. This effect is, however, much to be difputed, fince the different fubftances are changed and elaborated in the veffels of the vegetables before they become fit for the purpofe of their increafe.

It is afferted by the author of the Scotch Forcing Gardener, that "a combination of ftable dung, fea-weed, lime, and vegetable mould, which has lain in a heap for three or four months, and has been two or three times turned during that period, will make an excellent manure for moft kinds of garden land." Alfo that of "cow dung and fheep dung, mixed with foot or any of the kinds of afhes;" and that "pigeon dung, marle, and vegetable mould, well mixed, will

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make an excellent manure for heavy land; or even for lighter ſoils, provided the pigeon dung be uſed ſparingly." But that "pigeon dung, lime, ſoot, aſhes, &c. ſhould never be applied in a ſimple ſtate; the quantity of them required being comparatively ſmall, and the regular diſtribution difficult without the admixture of other matters. It is further obſerved, that he has "witneſſed the aſtoniſhing effects of whin aſhes alone, in producing herbage in a five or ſix-fold degree; which was the more obvious, on account that the field on which they were applied was much alike in quality (a ſtiff, wet, clayey loam), and the aſhes applied partially. The effect was viſible for ſeveral ſucceſſive years. Alſo, on the timber trees with which the field was afterwards planted." He conceives that "marle is an excellent manure for almoſt any ſoil; and may be applied as a ſimple manure with as much propriety as any of the kinds of cattle dung, or even vegetable earth. The kind called ſhell marle is, it is ſuppoſed, much to be preferred; and ſhould be freely applied to ſtrong lands, but ſparingly to light; the loamy kind being beſt adapted to light lands."

Where ſtable dung is uſed in a ſimple ſtate, it "ſhould not," it is ſuppoſed, "be applied in too rank a ſtate, nor ſhould it be too much fermented. It ſhould generally lie in a heap for two or three months; during which time it ſhould be turned twice or thrice. A ton of it in this ſtate is worth three that has been uſed in the hot-bed, and are a year old. This manure, and indeed dung of any kind, when thus applied, ſhould never be carried from the heap to the ground till it is to be digged in; as, by its expoſure to the air, the virtues evaporate, and it is the leſs effectual."

And when made uſe of in a ſimple condition, it is imagined "the neceſſity of the inſtant application of ſea-weed after its landing, is even greater than in the above caſe; as it inſtantly corrupts, and its juices not only evaporate, but flow downwards, and are loſt. If this manure be uſed as a compound, the heap wherein it is compounded ſhould be more frequently turned on its account, that none of the juices may be loſt, but that the other part of the compoſt may abſorb them."

It is his opinion that "vegetable mould may either be uſed in a ſimple or compound ſtate, and may be applied with equal propriety to all ſoils. None can be hurt by it in any degree; ſince almoſt every plant will grow luxuriantly in it entirely, without the aid of any ſoil or manure whatever. It is conceived that manures have the effect of correcting tenacity, crudity, and poroſity in ſoils, exciting their fermentation, communicating nutritive matter to them, and affording nouriſhment to the roots of plants, by which the vegetation and perfect growth of them are promoted and increaſed.

There are likewiſe conſiderable differences in the materials made uſe of as manures, in their affording their nutritious properties, ſome affording them much more readily and more abundantly than others. This is the caſe with animal, vegetable, and all ſuch matters as are rich in mucilage, the ſaccharine principle, and calcareous earth, and which readily afford carbon, phoſphorus, and ſome gaſeous fluids, ſuch as the carbonic acid gas, oxygen, &c. while others which are greatly deficient in all or moſt of theſe principles, or which do not part with them eaſily, are found by experience much leſs beneficial in promoting the growth of vegetables, fruits, &c.

However the effects and importance of manure are now generally acknowledged and underſtood, it would appear to be the indiſpenſable duty of the gardener and cultivator to be particularly careful in the collection of it, and alſo to diſtribute it with the moſt ſkilful frugality. "For this purpoſe, it is ſuggeſted that where it is capable of being formed, a well, ciſtern, &c. ſhould be contrived ſo as to collect the dung-hill drainings; and that in the application of manure of any kind, the greateſt care ſhould be taken to divide it equally, according to the quantity to be applied." Alſo, further, that "the dung-hill may be conſiderably increaſed by throwing the haulm, ſtalks, and leaves of all vegetables into a common heap, letting them remain till well rotted, and afterwards, or, in the proceſs of collection, mixing them with lime, marle, aſhes, ſoot, &c. Watering the whole frequently with the drainings of the dung-hill would alſo greatly enhance its value."

It is likewiſe evident that the ground of gardens may often be greatly ameliorated and improved by proper draining, before the manures are applied, and ſometimes by the uſe of ſandy, gravelly, and other ſimilar materials, that have the power of opening, and rendering it leſs cloſe and adheſive. See MANURE, *ſupra*.

MANURING *of Land*, in *Agriculture*, the application of the various ſubſtances which are capable of being employed as manures to the ſoil, in ſuch a way as to produce the moſt beneficial effects in the production of crops, whether of the grain, graſs, root, or other kinds. In this buſineſs various circumſtances are neceſſary to be conſidered, ſuch as the ſtate or condition of the manures which are to be made uſe of, the nature of the ground on which they are to be laid, the kind of crop that is to be promoted by them, and the ſeaſon of the year in which they are to be put into or upon the land; for as it has been ſhewn that changes are continually taking place from the moment the materials of the dung-heap are thrown together, to the period in which they are reduced into a black carbonic earthy matter; and that in moſt of the different ſtages through which they paſs in this proceſs of decompoſition, ſuch ſubſtances are formed as are capable of contributing to the nutrition and ſupport of vegetable crops; it is conceived "probable, that in caſes where manures are to be turned into the ground, and ſuch crops cultivated as require a ſupply of nouriſhment for a length of time, they ſhould be employed in their long or more imperfectly reduced ſtates, as by the heat which is evolved in the commencement of their diſſolution, the proceſs of early vegetation may be greatly promoted, and their gradual decompoſition and decay afterwards, under the ground, afford a more durable and regular ſupply of nutrient materials, and thereby contribute more effectually to the growth of the crops; but that where they are to be buried in, or applied to the ſurface of the ſoil, and intended merely for the benefit and ſupport of ſuch crops as are of ſhort duration, or quickly arrive at their full growth, they may be more advantageouſly made uſe of after they have been more fully and completely reduced, as in this ſtate the manure is, in the caſe of graſs lands, not only capable of being ſpread out in a more regular and uniform manner, by which it becomes more evenly as well as more generally carried down to the roots of the plants by rains, but it is in the moſt ſuitable condition for allowing the young plants the means of ſpringing up with facility, and at the ſame time, whether uſed under or upon the ſoil, of affording the crops that abundant ſupply of nouriſhment which is neceſſary to their ſpeedy growth and great luxuriance, and by theſe means to contribute moſt perfectly to the promotion of their increaſe." In addition to "theſe advantages of long, or imperfectly decayed manures, they have others that depend on the ſoil into which they are turned, and the nature of the crops that are ſown or planted with them. Where they are employed in ſuch ſtiff, clayey, or loamy grounds, as have a great tendency to become dry

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and hard, and thereby incapable of admitting the tender fibrous roots of grains or other plants to ſpread or extend themſelves, and draw in more abundant ſupplies of nouriſhment, they may be uſeful by keeping the earth around them in a more open and porous ſtate, from the ſlowneſs of their decompoſition, and the gradual and continued manner in which the different elaſtic matters are ſet looſe and united with the ſoil. Hence, when barley, or ſuch kinds of grain as require a rather light and open ſtate of ſoil, and thoſe bulbous or knobby-rooted plants, ſuch as potatoes, that require much room to ſhoot and extend themſelves, are cultivated on ſuch ſtiff ſoils, they are generally found to be the more productive, where ſuch long or imperfectly reduced manures have been made uſe of in the preparation of the land." And that "as in the ſlow and gradual decompoſition of the materials which are made uſe of for manures, when ſlightly depoſited beneath the ſoil, there is much leſs waſte of heat and thoſe elaſtic matters which contribute ſo greatly to the ſupport of vegetation, than where they are made to undergo the various proceſſes of diſſolution in large maſſes, as in dung-heaps, they may probably ſometimes on that account be moſt advantageouſly employed in this ſtate." Alſo "on this principle the ploughing down of freſh vegetable crops, in many caſes, in their moſt ſucculent ſtates, may be a more economical as well as more beneficial practice; eſpecially in ſuch light and dry kinds of ſoil, as will more readily admit of their gradual putrefaction and decay, than to cut and take them off for the purpoſe of being by other means converted into manure. It ſeems likewiſe probable, on the ſame grounds, that for the production of crops of the bulbous-rooted vegetables on the more ſtiff and tenacious ſoils, the matters made uſe of as manures may be employed with the greateſt advantage, when put into the earth before they have undergone any great degree of decay by means of putrefaction, as in this way there is no waſte, the whole being ultimately converted and applied, though more ſlowly, to the ſupport of the crops for which they are immediately employed." It has been ſtated as the opinion of a practical farmer, that ſtable dung never anſwers better than when carried on to the land as ſoon as made. He laid it on a piece of wheat in froſty weather, and at harveſt the crop was laid to the ground. And on graſs lands, it is ſuppoſed, when laid on in the ſpring, to ſcreen it from the cold winds, and occaſion it to be more forward, and that in the ſummer the ſtrawy part protects the land from the ſun; and in either ſeaſon it is ſoon grown in and nearly loſt to the eye. See Communications to the Board of Agriculture, vol. iv.

Manures, proper Seaſon of Application.—In regard to the time or ſeaſon of applying manures "with the greateſt benefit and advantage, though in practice it muſt, in ſome meaſure, depend on the ſtate of the land, the nature of the crop, and the convenience of the farmer, it ſhould, in caſes where they are buried in the ground, be as nearly as poſſible to the periods in which the ſeeds, or the roots which they are deſigned to ſupport, are ſown or placed in the earth; where they are to be laid upon the ſurface of the land, it ought probably to be juſt before the crops of graſs, or other vegetables, begin naturally to ſpring or ſhoot forth." As in this practice of depoſiting and blending the manure with the ſoil, nearly at the time the crops are put in, there is ſcarcely any waſte of the fertilizing properties of ſuch ſubſtances, which, as they gradually proceed in their decompoſition and decay under the ground, muſt otherwiſe be the caſe, the roots of the plants not being in the moſt proper ſtates for taking them up and converting them to their ſupport. Beſides, in ſtiff, loamy, or clayey ſoils, they have a tendency, as has been remarked above, to produce a degree of lightneſs and friability that is ſuited to the early proceſs of vegetation." The author of Phytologia has well remarked, that "the atmoſpheric air, which is buried along with the manure in the interſtices of the earth, and which for many weeks, or even months, renders the ſoil looſe and eaſily impreſſed by the foot on walking on it, gradually evolves, by its union with carbon, a genial heat, very friendly to vegetation in this climate, as well as the immediate production of much fluid carbonic acid, and probably of a fluid mixture of nitrogen with hydrogen, which are believed to ſupply much nutriment to plants."

The uſing of ſuch manures as are made uſe of in the way of *top-dreſſings* in the early ſpring, is a practice by which "they are laid on at the moſt favourable period for affording their nutritious principles, and for their being drank up by the roots of plants, and conſequently become uſeful at the time they are moſt wanted for the promotion of the crops, and the great waſte which muſt otherwiſe be cauſed, either by the exceſſive falls of rains and floods in the winter ſeaſon, waſhing down much of the valuable properties into the adjoining rivers and ditches, or the evaporation of their more volatile or elaſtic matters by means of the ſummer heats, is moſt effectually guarded againſt and prevented." It is hinted that the practice common in ſome places of applying manure to graſs lands in the latter end of the ſummer or beginning of autumn, after the firſt crop of hay has been taken from the ground, and the after-graſs has begun to make ſhoots, is not by any means ſo favourable as that of early ſpring, as in the latter caſe the generation of thoſe materials that contribute to the ſupport of vegetation is greatly promoted by the conſtantly increaſing heat of the vernal and ſummer months; while in the former it is conſtantly checked and retarded by the increaſing coldneſs of the autumn and winter ſeaſons. Beſides, the manure, by being ſpread out upon the ſurface of the land under ſuch circumſtances, muſt be the cauſe of great loſs, by contaminating the after-graſs, and rendering it incapable of being eaten off by cattle or other kinds of live ſtock." Yet, "where a ſecond crop of hay is to be taken, it may ſometimes be put on at ſuch times with advantage to it, eſpecially if the weather be not too hot, and the manure in a perfectly fine and reduced ſtate, ſo as not to impede the mowing. It has been remarked by doctor Fenwick, in his ingenious reflections on manures, "that it is ſcarcely poſſible to ſuggeſt a worſe mode of uſing manures on graſs lands, than that which is almoſt univerſally practiſed in the neighbourhood in which he reſides;" and it is the ſame in many other parts of the country, as is evident from the reports that have been lately publiſhed by the Board of Agriculture. "When," ſays he, "a ſevere froſt has bound up the land in a ſtate of impenetrable coheſion, the farmers wheel on their dung, perhaps even when ſnow has covered it. While the froſt laſts, the land can derive no advantage from the manure, and when a thaw ſupervenes, it is evident that the waſh from the melting ſnow, or from the rains which generally fall in ſuch weather, muſt deprive the maſs of every part that is ſoluble. The ground, in the mean time, retains the froſt for many days, and is therefore incapable of abſorbing the wet which falls upon its ſurface; and even when the influence of the milder air has reached it, it can imbibe but little, being in general previouſly filled with water, and the quantity which flows over it being too great for ſoil, under any circumſtances, to drink up." It is believed by the ſame writer, that in ſupport of this deſtructive and waſteful practice, however much it may have been defended on the ground of the farmer's leiſure or convenience, and the little injury

injury done to the turf or fward of the land, there can be only one reafon alleged, which is, that manure, when fpread early in the winter, may protect the roots of graffes from the feverity of frofts. And this, the author of "Practical Agriculture" fays, "is probably a miftaken notion, as it is known to every one that the common graffes are feldom injured by the fevereft frofts; and other kinds of graffes may probably not fuffer lefs injury from the application of manure at fuch a feafon, than from the feverity of frofts." It is therefore concluded, that "on all thefe accounts, farmers fhould contrive as much as poffible to apply the manures, intended as top-dreffings to grafs lands, as early in the fpring as it can conveniently be done, which may be eafily managed on thofe that are dry, and on fuch as are inclined to be wet and poachy, it may probably be greatly facilitated by having fmall light carts conftructed for the purpofe, and placed on broad cylinders as wheels." For he is convinced, from the trials which he has made in applying manures to grafs lands at fuch periods, that the trouble of the farmer will not only be rewarded by much larger crops of hay, but alfo by a confiderable increafe in the quantity of the after-grafs; and, befides, his crops in both inftances will be more forward than in the ordinary methods of putting them on, either in the autumn or winter months, which in many cafes is a circumftance of great importance." There are others, however, who confider the early autumn as by much the beft feafon, as may be feen under the head of manuring new laid down grafs lands at firft. See LAYING *down to grafs*.

In Young's calendar of hufbandry, it is ftated, that "the proper feafon for laying on feveral forts of manure, fuch as foot, coal-afhes, wood-afhes, lime, malt-duft, &c. and in general all thofe that are fpread in too fmall quantities to require a whole winter's rains to wafh them in," is in February. The ufe of thefe manures, and other light dreffings at this period, is, he fays, very beneficial; "but, throughout the management of purchafed manures, experiments fhould be formed for a year or two, before the practice is extended, to fee which, at a given price, will fuit the land beft. Without this precaution, a farmer may probably expend large fums of money to little purpofe. Nor would he advife him to truft to the mere appearance of the effect foon after the manuring; for fome of them, particularly foot and malt-duft, will fhew themfelves after the firft heavy fhowers, in a finer green than the reft of the field; but the proof of the effect does not arife from fine greens, but from weight of hay; for he has himfelf found from experience, that the latter is not always an attendant on the former. Contiguous half-acres, or roods, fhould be marked out, the prices of the manures calculated, and on each piece a feparate one fpread, all to the amount of 20*s.* an acre, for inftance, at hay-time, the crops fhould be weighed. It will then be known which manure, at the given prices, fuits the foil beft. This knowledge will prove true experience, and a very different guide from general ideas." And "this is likewife, he adds, the feafon for fpreading fuperficial dreffings on the green wheats, fuch as foot, afhes, malt-duft, pigeons'-dung, poultry-dung, rabbits'-dung, &c. and many other forts in the neighbourhood of great cities. It is very good hufbandry; but the profit depends on the expences." He therefore recommends "trying them in fmall portions, (a rod, for inftance, to each) before extending the practice to whole fields, efpecially thofe which are not dungs. As to the latter, provided the prices be not extravagant, there can be no doubt of their anfwering to all foils. Whenever a farmer has the choice of manures, never let him hefitate about which to take. He may lay it down as a maxim, that dungs of all forts are excellent. Other manures may be the fame, but they are not, he thinks, fo univerfally beneficial to all foils."

It is alfo ftated, that furriers' clippings are fown by hand from the feed fcuttle, at about 3*d.* *per* quarter, in March, on the land intended to be fown with wheat or barley, and immediately ploughed in, after which the feed is fown and harrowed in, when fuch pieces of the clippings as are left above ground by the harrow, are pricked or fhoved into the ground by the end of a ftick, to prevent their being devoured by dogs or crows, who feize them greedily. From two to three quarters are ufually fown *per* ftatute acre. Thefe clippings are faid to anfwer well on light dry chalk or gravelly foils, where they are fuppofed to hold moifture, and help the crop greatly in dry feafons, but they have little effect on wet foils. And horn fhavings, which are of two forts, fmall and large, are ufed in the fame way and quantities as the above article, except that they want no pricking; and the large are generally ploughed into the land three months before fowing wheat or barley. This fort of fhavings anfwers well in moft foils and feafons, except very dry ones, when they will not work. The fmall fhavings are much the moft ufeful. Woollen rags are alfo fown by hand and ploughed in three months before fowing wheat or barley; the quantity ufed is from fix to ten cwt. *per* ftatute acre. Woollen rags, like furriers' clippings, hold moifture, and are adapted for dry, gravelly, and chalky foils, and fucceed in dry feafons better than moft manures, but they do little good on wet foils. London rags are found much better than thofe collected in the country; but the danger of catching the fmall-pox in chopping and fowing them, deter many farmers from making ufe of them. Sheeps'-trotters, and fellmongers' cuttings, are ufed in the fame way as furriers' clippings, from 20 to 40 bufhels *per* acre, and need pricking in, as dogs and crows are very fond of them. They do not anfwer on wet land, or in very dry feafons; indeed nothing does fucceed in exceffive dry feafons on thefe foils. Malt-duft is alfo fown by hand from 24 to 32 bufhels *per* acre, at the fame time as barley, and harrowed in with the feed. It fuits moft foils and feafons; but it quickly fpends itfelf, and is therefore never fown with wheat; as a top dreffing to wheat in March, at about 30 bufhels *per* acre, it would probably fucceed on thefe forts of foils. Pigeons'-dung is ufed in the fame manner as malt-duft, and does good in any foil or feafon. Soap boilers' afhes have alfo a great effect on cold fward. Hogs' hair, when applied in the fame manner as clippings, is faid to anfwer well. And feal hair, rabbits' dung, and lime, have been tried upon thefe kinds of foils, but not found to anfwer in any very advantageous degree.

Depths of depofiting Manures in Soils.—It is ftated by a late writer, that as "the putrefaction and decay of animal and vegetable matters, whether above or beneath the ground, is greatly promoted by the free admiffion of air and a fuitable degree of moifture, it is evident that they fhould not be buried fo deep in the earth, as that they may be prevented from readily receiving the aid of fuch caufes in forwarding their decompofition; nor, as the procefs is known to be much retarded by the fubftances being rendered too dry, fhould they be placed fo near the furface, or be fo thinly covered as to permit the action of the fun and winds, before the crops have rifen to fuch heights as to prevent it from diffipating and carrying away their nutritious properties. The introduction of the manure to a middling depth, as three or four inches, would of courfe, on thefe accounts, as well as from its contributing more expeditioufly and more fully to the vegetation of the crops that

that may be put in with it, feem, in general, to be the moft advantageous practice; but on the lighter and more friable foils, it may be advifable to plough it into a greater depth than in fuch as are heavy and tenacious. In every cafe, however, whether the manure made ufe of be in a long or a more reduced ftate, it fhould be perfectly covered or ploughed into the earth. The practice of burying manures deep in the foil, has been defended by fome on the ground of its being the nature of elaftic matters to rife or force themfelves towards the furface; but when they are placed to a confiderable depth in the earth, as the procefs of decompofition is thereby ftopped, or fuffered to proceed in but a very flow and feeble manner, little or nothing efcapes for the fupport of vegetation, or it is furnifhed in fo very flow and fparing a way, as to be of fcarcely any fervice to the immediate crops. Thus, in the cultivation of fuch crops as are placed in rows or drills, where the manure is put into a great depth and covered pretty thickly with earth, on digging them up at the end of many months, it may frequently be obferved nearly in the fame ftate it was when firft put into the ground. And the fame thing is often noticed by gardeners, where imperfectly reduced, or long dung is placed in deep trenches and covered to a confiderable thicknefs with mould." It is alfo added, that "in order that manures may produce their effects in the moft perfect manner, they fhould be fpread over the furfaces of the grounds as evenly as poffible, whether they be intended to be turned into the foil or left upon its furface as top-dreffings;" a point that "may be greatly facilitated by placing the manure out at firft in very fmall heaps, as by fuch a practice it may be fpread over the ground with much greater eafe and exactnefs; and on grafs lands much lefs injury will be done by the bottoms of the heaps."

And it is evident, that on tillage lands, manures fhould always be turned in, or otherwife covered, as foon as poffible after they are fpread out; for if this be neglected, much lofs may be fuftained, efpecially in hot feafons, by the quick evaporation that takes place in fuch cafes. The beft practice is, of courfe, not to carry more out from the dung-hill at a time, than can be conveniently fpread upon and ploughed into the earth in a fhort time afterwards. It is obferved in a periodical work, that the fhorteft poffible fpace of time fhould be fuffered to elapfe between the fpreading out the manure, and the ploughing it into the lands, as well as between this laft operation and that of fowing the feed. And it has been fuggefted, that "in fpreading manures employed as top dreffings on grafs lands, much advantage will be gained by breaking and reducing the clods or lumps into as fine a ftate as poffible, as by fuch means they are not only applied more perfectly, but wafhed by the rains much more readily to the roots of the graffes. The fpringing of the young graffes is alfo lefs retarded, where the manures are rendered fine and powdery, than where they are left in a cloddy, rough ftate." The nature of the foil, and the purpofe for which the manure is applied, fhould likewife be carefully attended to in this bufinefs, as no one method is adapted to every cafe that may happen.

It is ftated, in refpect to the economy of their application, that "it feems not improbable but that fome degree of faving may occafionally be made, by applying them on lands under tillage, as well as others, nearly at the time the feeds and roots are put into the ground, or when the graffes begin to fhoot; as from the whole of the manure being in this way made to contribute directly to the fupport of the crops, a lefs quantity may be fufficient for the purpofe: how far they may be fafely diminifhed on this principle, can only be fhewn by actual experiments and accurate deductions made from them; but there are fufficient grounds, from what has been obferved, for fuppofing that it may be confiderably more than can be eafily apprehended by thofe who have not adverted much to this circumftance. There is another economical mode of employing manure, which is, by placing it in the drills or hollows formed for the reception of different crops which are cultivated in rows, as peas, beans, cabbages, potatoes, &c.: by this method, that part of the ground which is intended to bear the crop, is only manured, the intervals or fpaces between the rows not receiving any, from which, where the bufinefs of putting the manure into the drills is properly performed, a great faving muft of courfe be made."

According to the conclufions of fome, "the faving of manure in this way is fo great, as to conftitute one of the chief advantages of the drill fyftem of cultivation. And the calculation of the experienced farmer is, that by "drills being made two feet afunder, and each drill fix inches wide at the bottom, there will be juft one-fourth part of the ground covered with manure; for as fix inches multiplied by four gives two feet, which will be the diftance from drill to drill, and as four multiplied by four makes fixteen, it follows, that if the whole of the land had been covered with manure, fixteen loads would have been required for what is as fully and beneficially performed by four, that is, by one quarter of the quantity ufed by the old method of dreffing, fuppofing it of the fame thicknefs and quality." Befides, from the manure being in this way kept more clofely together, and the crops placed immediately upon it, they muft, he fufpects, receive the advantage of the dreffing in a more full and complete manner than under other circumftances could be the cafe.

Dr. Dickfon, in his work on practical agriculture, fuggefts, that "as it appears probable that in the decay of different materials in the foil, all the nutritious matters as they are formed immediately become ufeful for the purpofe of vegetation, without any wafte being fuftained, as muft always be more or lefs the cafe where they are depofited together in heaps, it may be an economical practice, in cafes where the crops to be benefited by them require a regular and lafting but not large fupply of nourifhment; or where the ground is required to be kept in an open and rather light ftate, for a confiderable length of time, to employ fuch manures in their lefs decompofed ftates, as by the ploughing down of green fucculent vegetable crops, and the turning in of long ftrawy fubftances. By adopting fuch means, the more perfectly formed manures of the farm may be referved for fuch crops of luxuriant vegetables as demand more fpeedy and abundant fupplies of nutrient matters." And in what refpects the advantage of ufing one fort of manure in preference to another, it may be remarked, "that as animal matters are found in general to undergo more fpeedily the procefs of putrefaction or decompofition than thofe of the vegetable kind, and as in moft inftances they afford thofe mucilaginous and elaftic principles that contribute fo largely to the fupport of vegetable life in greater proportions; fuch manures as are either wholly or in a great meafure compofed of them, muft be the moft beneficially employed, where quick and abundant fupplies of nourifhment are required, as in the growth of all the more grofs and luxuriant crops, whether of grain, plants, or graffes; and that as thofe vegetable fubftances which contain faccharine, farinaceous, oily, faline, or mucilaginous principles in the largeft quantities are afcertained from experience to proceed the moft readily into the ftate of diffolution or decay, and confequently to afford more fully and more expeditioufly the nutrient food of new plants, where manures

manures are principally formed from them, they ſhould be preferred to ſuch as have been made from the harder and more ligneous vegetable ſubſtances, that contain ſuch properties in ſcarcely any, or much ſmaller degrees, for all the purpoſes of agriculture." Laſtly, that "ſuch ſubſtances as are found to contain thoſe elementary materials of which vegetables are principally conſtituted in their more ſoluble or looſely combined ſtates, as carbonaceous matter in the black earths or moulds, and oxygen, azote, and hydrogen, in burnt clay, raddle, manganeſe, and calamy, ſubſtances which have hitherto been little employed, as well as in water and air, ſhould be made uſe of in preference to thoſe which poſſeſs them in ſlight proportions or ſcarcely at all."

With regard to the particular modes of preparing and making uſe of the ſeveral articles that are capable of being applied to lands ſo as to ameliorate and improve them in the production of different ſorts of crops, they will be more fully explained under the particular heads to which they immediately relate.

MANUS was anciently uſed for an oath, and for him that took it as a compurgator. And it often occurs in old records: *tertia quarta, &c. manu jurare;* that is, the party was to bring ſo many to ſwear with him that they believed what he vouched was true: and we read of a woman accuſed of adultery: *mulieri hoc neganti purgatio ſexta manu extitit indicta:* i. e. She was to vindicate her reputation upon the teſtimony of ſix compurgators. Reg. Eccl. Chriſt. Cant. If a perſon ſwore alone, it was *propria manu & unica.* The uſe of this word came probably from its being required at a perſon's hands to juſtify himſelf; or from laying the hand upon the New Teſtament, on taking the oath.

MANUS *interoſſei,* in *Anatomy.* See INTEROSSEI.

MANUSCRIPT, a book, or paper, written with the hand. By which it ſtands oppoſed to a printed book, or paper. A manuſcript is uſually denoted by the two letters MS. and, in the plural, by MSS. or MMSS. What makes public libraries valuable, is the number of ancient manuſcripts depoſited in them. See ALEXANDRIAN, CAMBRIDGE, CLERMONT, COTTONIAN, HARLEIAN, VATICAN, &c.

MANUZIO, ALDO, the elder, in *Biography,* a celebrated printer and man of letters, was born at Baſſano, in 1447. Having laid a good foundation, at his native place, in grammar learning, he was ſent to Rome, where he purſued his claſſical ſtudies under Gaſpar da Veronna, and removing thence to Ferrara, he had the advantage of learning Greek from Battiſta Guarino. During his reſidence at the latter city he was employed to give private leſſons to Alberto Pio, prince of Carpi, and to Hercules Strozzi, afterwards a diſtinguiſhed poet. In the war between the Venetians and the duke of Ferrara, in 1482, Aldo was obliged to quit that city, and he took up his abode with that patron of literature John Pico of Mirandola. He afterwards viſited his pupil Pio, and it is probable, that with the aſſiſtance of theſe two enlightened nobles, he ſet up a printing office at Venice, for the purpoſe of giving correct and elegant editions of the Greek and Latin claſſics. His firſt work did not appear till 1494, after the preſs had been eſtabliſhed about ſix years; but in the courſe of the next twenty years he had printed almoſt every Greek and Latin claſſic, as well as a number of other books. He was the inventor of the Italic character, called for a conſiderable time the *Aldine,* and obtained from the ſenate of Venice, and the pope, patents for its excluſive uſe for a number of years. To render the editions that iſſued from his preſs correct, he procured the aſſiſtance of ſome of the beſt ſcholars of the age as editors. Aldo likewiſe eſtabliſhed a kind of academy in his own houſe, at which the literati of Venice aſſembled, on fixed days, to diſcuſs various literary topics. Aldo was very deſirous of rendering his academy perpetual, but it did not long ſurvive him, though it was ſucceeded, not long after his death, by the Venetian academy. He married the daughter of Andrea d'Aſola, from whom he obtained ſome pecuniary aſſiſtance, and with whom he entered into partnerſhip. The wars of Italy impeded their labours, and by theſe Aldo loſt a very conſiderable property, which he took much pains to recover, and in the attempt fell into the hands of the ſoldiers of the marquis of Mantua, by whom he was plundered and impriſoned; but on making himſelf known, he was liberated with much reſpect. This was in the year 1506, and during the ſix ſubſequent years, he printed very little, but in 1513 and 1514 he reſumed his labours; and was cloſely engaged in his employment, when he was carried off by diſeaſe in April 1515. Aldo Manuzio held a ſchool in Venice for the Greek language: that his own learning was conſiderable, there are abundant proofs in the diſſertations and prefaces of his own compoſitions, which are prefixed to his editions of the Greek and Roman authors; and alſo in his Latin letters that have been printed in various epiſtolary collections. He publiſhed a Latin grammar compiled by himſelf; and a treatiſe "De Metris Horatianis:" he tranſlated various pieces from the Greek into Latin, and he compiled with great labour a Greek dictionary. He was viſited by all the learned ſtrangers who came to Venice; but to prevent a waſte of time which he could ill afford, he put up an inſcription over his ſtudy door, deſiring that viſitors would make their ſtay very ſhort, unleſs they had ſomething important to communicate. Though his editions were not, and could not be expected to be, immaculate, yet there are but few perſons to whom literature is more indebted than to Aldo Manuzio.

MANUZIO, PAULO, ſon of the preceding, an eminent ſcholar and printer, was born at Venice in 1512. He received the rudiments of an excellent education at Aſola, whence he was early removed to a more learned inſtructor at Venice, under whom he made extraordinary progreſs. When he had attained to his twenty-firſt year, in 1533, Paulo re-opened the printing office which had been ſhut from the death of Andrea, and the buſineſs was conducted under the joint names of the heirs of Aldo and Andrea. In 1535 he paid a viſit to Rome, on the promiſe of an eſtabliſhment there, but his hopes were for the preſent entirely diſappointed, and the only advantage which he derived from his journey was the friendſhip of ſome learned men in that capital. After his return, he opened an academy for the inſtruction of twelve young men of family, in polite literature: he continued in this employment about three years, and then made a tour through the cities of Italy, for the purpoſe of examining the beſt libraries. His reputation for learning procured him ſeveral offers of profeſſorſhips, but he did not engage in any of them, and his appointment to ſuperintend a printing office ſet up by the academy of Venice gave occaſion to his becoming diſtinguiſhed in his proper profeſſion, by ſeveral very elegant and accurate works; the inſtitution was, however, but of a ſhort continuance. About this time his eyes were ſo weak, or diſeaſed, that he was obliged to quit his ſtudies till he obtained complete relief by the aſſiſtance and advice of Fallopius. A liberal and magnificent plan had been formed at Rome for the printing of all the moſt valuable Greek MSS. in the Vatican. In the mean time, the progreſs of the Reformation, and the ſitting of the council of Trent, had rendered theological works in great requeſt, and it was determined to give Vatican editions of the fathers and other eccleſiaſtical writers, which might furniſh weapons to the defenders

defenders of the church. To unite correctnefs with elegance in thefe editions, the pope, Pius IV., invited Paulo Manuzio to Rome; he accepted the invitation, and arrived in the fummer of 1561. The prefs provided for him was in the Capitol, the palace of the Roman people, whence the works printed at it were infcribed "Apud Paulum Manutium in Ædibus Populi Romani." In 1570, either diffatisfied with his emoluments, or finding the air of Rome injurious to his health, he returned to Venice. From this period he fpent much of his time in travelling from place to place, till at length pope Gregory XIII. engaged him to ftay at Rome by the offer of a penfion, which allowed him to devote all his time to his ftudies. He died at Rome in April 1574, in the fixty-fecond year of his age. The learned world is indebted to Paulo for many valuable works of his own, befides thofe of others which he ufhered into the world. He was the diligent annotator on the works of Cicero and Virgil; he was much attached to the ftudy of Roman antiquities, and was the firft who difcovered the Roman calendar, which he publifhed from his fon's prefs with two tracts, "De veterum dierum ratione," and "Kalendarii Romani explicatio." He had formed the plan of a great work in which every topic of Roman antiquities was to be illuftrated, but of this he only publifhed "De curia Romana." He formed a collection of letters, as well Italian as Latin, and among thefe, his own letters in both languages may be compared with the beft of other writers. His Latin letters have frequently been reprinted, and are truly Ciceronian in their ftyle: the Italian compofitions are valued for their unaffected elegance and fimplicity. He publifhed many other works which were efteemed and applauded by the firft fcholars of his age: and as a printer he has merited high praife, as well on account of the beauty as the accuracy of his editions.

Manuzio, Aldo, the younger, fon of the preceding, was born in 1547. His father paid the utmoft attention to his education, and fo extraordinary was the progrefs of the youth in learning, that he was enabled to give the world "A Collection of elegant Phrafes in the Tufcan and Latin Languages," when he was only eleven years of age. Other juvenile works at different periods marked his advances in claffical literature, and he foon became his father's affiftant in his labours, both learned and typographical. He, when very young, conducted the printing bufinefs at Venice while his father was engaged at Rome. In 1572 he married a lady of the Giunti family, fo well known in the annals of typography, and on the death of his father, in 1574, all the concerns of the Aldine prefs devolved upon him. He was, however, lefs calculated for the bufinefs of a printer, than for the profeffion of an author. In 1577 he was appointed profeffor of the belles lettres in the fchool of the Venetian chancery, in which young men defigned for public employments were educated. This office he held till the year 1585, when he was made profeffor of rhetoric at Bologna. In the fame year he publifhed the "Life of Cofmo de Medici," which was fo well received, that he was almoft immediately invited to undertake the profefforfhip of polite literature at Pifa, which he accepted, although he received an invitation at the fame time to a profefforfhip at Rome, which had been lately held by Muratus. During his ftay at Pifa he received the degree of doctor of laws, and was admitted a member of the Florentine academy, on which occafion he delivered an eloquent oration "On the Nature of Poetry." He now paid a vifit to Lucca in order to obtain materials for a "Hiftory of Caftruccio Caftracani," which he afterwards publifhed, and which is much applauded by De Thou. The Roman profefforfhip being referved for him he removed thither in 1588, and intending to fpend his life there, he caufed his whole library to be brought to Rome from Venice, at a very great expence. He was in high favour with Sixtus V., who gave him an apartment in the Vatican, and a table at the public expence. He was alfo patronized in various ways by Clement VIII. He died in the 51ft year of his age in the month of October 1597. He left no pofterity, and with him ended the glory of the Aldine prefs. His library, confifting of 80,000 volumes, collected by himfelf and his predeceffors, was fold to pay his debts. He was author of many performances befides thofe already mentioned, but the moft celebrated of his works were his "Commentaries on all the Works of Cicero," in ten volumes. His "Familiar Letters," publifhed in 1592, were highly efteemed.

MANWAS, in *Geography*, a town of Hindooftan, in Boggilcund; 30 miles S.E. of Makoonda.

MANWORTH, in *Old Law Books*, denotes the price, or value, of a man's head.

In ancient times, every man, according to his degree, was rated at a certain price, according to which, fatisfaction was made to his lord, if any one killed him.

MANZANARES, in *Geography*, a river of Spain, which paffes by Madrid, and runs into Herares, about eight miles below that city.—Alfo, a river of America, in the Caraccas, which wafhes the city of Cumana. Its refrefhing ftream fertilizes lands otherwife fterile, which are thus rendered productive of fruits and vegetables in abundance.

MANZANAREZ, a town of Spain, in the province of New Caftile and diftrict of La Mancha, the population of which is eftimated at about 6768 perfons. The houfes are built with mud, and the poor are almoft naked. It is one of the principal quarters of the royal Carabineers. The caftle, with a confiderable eftate, and the tithes, belong to the knights of Calatrava, and yield a revenue of 3295*l.* *per annum*. The land about it produces corn, faffron, and good wine. The vineyards are numerous, and this part of the country produces the beft wine in La Mancha, and which is moft efteemed at Madrid. It has the flavour of the richeft Burgundy, with the ftrength and body of the moft generous port.

MANZANEDA, a town of Spain, in the province of Galicia; 20 miles E. of Orenfe.

MANZANELLO, a town of Spain, in the province of Leon; 23 miles E.S.E. of Valladolid.

MANZANILLA Key, a fmall rocky ifland near the S. coaft of Cuba. N. lat. 20° 54'. W. long. 77° 38'.

MANZAT, a town of France, in the department of the Puy de Dôme; 9 miles N.W. of Riom.

MANZEL. See Caravansera.

MANZINSKOI, in *Geography*, a fortrefs of Ruffia, in the government of Irkutfk, on the borders of China; 30 miles S.S.E. of Selenginfk. N. lat. 49° 5'. E. long. 108° 44'.

MANZOLI, Giovanni, in *Biography*, an opera finger of the firft order, born at Florence, and gifted with the fineft *foprano* voice which has been heard on our lyric ftage in our memory. He was, during many years, the firft finger in Italy; and when the court of Spain determined on having Italian operas performed under the direction of Farinelli, Manzoli was engaged for the principal man's part. From Madrid he went to Vienna, at the celebration of the emperor Jofeph's firft marriage. In 1764, he arrived in England, during the opera regency of Meffrs. Gordon and Vincent, at which period the ferious opera acquired a degree of favour to which it had feldom mounted fince its firft eftablifhment in this country.

The

The expectations which the high reputation of this performer had excited were so great, that, at the opening of the theatre in November, with the pasticcio of Ezio, there was such a crowd assembled at all the avenues, that it was with very great difficulty we obtained a place, after waiting two hours at the door. Manzoli's voice was the most powerful and voluminous soprano that had been heard on our stage since the time of Farinelli; and his manner of singing was grand and full of taste and dignity. In this first opera he had three songs, composed by Pescetti, entirely in different styles: *Recagli quell' acciaro*, an animated *aria parlante; Caro mio bene addio*, an adagio in a grand style of cantabile; and *Mi dona mi rende*, of a graceful kind, all which he executed admirably. The lovers of music in London were more unanimous in approving his voice and talents than those of any other singer of the last century.

The applause was hearty, unequivocal, and free from all suspicion of artificial zeal;—it was a universal thunder. His voice alone was commanding from native strength and sweetness; for it seems as if subsequent singers had possessed more art and feeling; and as to execution, he had none. However, he was a good actor, though unwieldy in figure, and not well made in person; neither was he young when he arrived in London; yet the sensations he excited seem to have been more irresistible and universal, than we have ever been witness to in any theatre. This great singer remained in England but one season, when, returning to Italy, he was succeeded by Elisi.

In 1770 we heard Manzoli sing at Florence in a convent at the last consecration of six nuns; he had quitted the stage, and his voice, though in a small chapel, seemed much less powerful than when he was in England; and it was then said by those who had heard him before, that, powerful as his voice appeared to all who heard him for the first time, it had been still better. This great vocal performer and worthy man died at Florence in 1791.

MANZORA, or CHIREIRA, in *Geography*, a river of Africa, which joins the Zambeze, S. lat. 16° 35'. E. long. 34°.

MANZORAH, a river of Hindoostan, which is a branch of the Godavery: this is a considerable river, which rises in the country of Amednagur, and after a circuitous course, joins the main river below Nander.

MANZUREKA, a river of Russia, which runs into the Lena, N. lat. 53 45'. E. long. 106° 34'.

MANZURSKA, a town of Russia, in the government of Irkutsk, at the junction of the Manzureka and Lena; 32 miles S.E. of Vercholensk.

MAO, or MAU, in *Botany*, a name by which some authors have called the *magna Indica*, or Indian mango-tree.

MAO, in *Geography*, a city of China, of the second class, in the province of Se-tchuen; 55 miles N. of Tching-tou. N. lat. 31 38'. E. long. 103° 32'.

MAON, a small island in the Adriatic, near the coast of Dalmatia. N. lat. 44° 44'. E. long. 15° 1'.

MAON, in *Ancient Geography*, a strong city of Palestine, in the tribe of Judah, which gave name to the neighbouring wilderness. It stood on a barren eminence, at a little distance to the S.W. of the Dead sea.

MAOPONGO, in *Geography*, a town of Africa, in Benguela, and capital of a district. S. lat. 10° 30'.

MAOUNA, or MASSACRE *island*, one of M. Bougainville's Navigator's islands in the South Pacific ocean, visited by La Perouse in 1787. This island is surrounded by a reef of coral, on which the sea breaks with great force; but the reef almost joined the shore, and the coast formed several little coves, in front of which were inlets where canoes could pass, and probably, says La Perouse, our barges and long boats. At the bottom of each of these creeks were numerous villages, whence came out a number of canoes in succession laden with pigs, cocoa nuts, and other fruits, which were exchanged for glass trinkets. When M. de Langle and several officers landed, night came on, and the Indians lighted a great fire to make the landing place clear; and hither they brought birds, pigs, and fruit. Upon the first visit, while perfect tranquillity and apparent good humour prevailed, and whilst the casks of La Perouse's frigates were filling with water, he entered a charming village situated in the midst of a wood, or rather orchard, the trees of which were weighed down by fruit. The houses were placed in the circumference of a circle, about one hundred and fifty fathoms in diameter, the centre of which formed a large open place, with a grass plat of the most beautiful verdure, and the trees which overshaded it kept up a delicious freshness. Women, children, and old men accompanied their new visitor, and invited him into their houses, where they spread the finest and freshest mats upon the ground, formed by small picked pebbles, and which they had raised about two feet to protect them from the damp. In the handsomest of these huts, probably belonging to the chief, was a large room of lattice work, equally well executed with those about Paris. This charming country, says our navigator, united the twofold advantage of a soil fertile without culture, and a climate which required no clothing. Bread fruit, cocoanut, banana, guavas, and orange trees furnished the inhabitants with abundance of wholesome nourishment; while fowls, pigs, and dogs, which live on the refuse of these fruits, afforded them an agreeable variety of food. They were so rich, and in want of so little, that they disdained our instruments of iron and stuffs, and coveted only some beads: burdened with real goods, they only wished for things that were useless. Our navigator was ready to pronounce the inhabitants of this richly stored and beautiful island the most happy beings on earth. But he soon found that this pleasant abode was not the mansion of innocence. Although no arms were perceived, yet the bodies of these Indians, covered with scars, proved that they must be at war with their neighbours, or quarrel among themselves; and their countenances indicated a ferocity imperceptible in the physiognomy of the women, whose persons were agreeable, and manners soft, lively, and engaging. Nature, says our author, had without doubt left this stamp on the figure of the Indians to denote, that man, almost wild and in a state of anarchy, is a being more mischievous than the fiercest of the animal creation. This first visit, however, did not pass off without private quarrels, which were terminated by prudent and wary conduct on the part of our navigators. The islanders became in process of time bold and insolent, and regardless of every restraint to which they were subjected. The two frigates had during their stay trafficked for 500 pigs, a great quantity of fowls, pigeons, and fruit, and all at the expence of a few beads of glass. La Perouse gave orders for quitting the island before the storm burst, which he perceived to be gathering, and the harmonious intercourse that had subsisted was interrupted, which he saw likely to be the case; but M. de Langle, the post captain, persisted in his purpose of obtaining a few long-boat loads of water before he left the island: the consequence was disastrous; the islanders became turbulent; and M. de Langle formed a body of 60 men from among the choicest men of the crews, armed them with muskets and cutlasses, and mounted six swivels in the long-boats, and thus prepared, they landed in order to obtain water. The number of canoes increafed, and the number of iflanders, who were collected in hoftile array on the fhore, amounted to 10 or 1200. M. de Langle and his companions betook themfelves to their boats amidft vollies of ftones, and the Indians furrounded them within the diftance of a toife: after a fhower of ftones, M. de Langle had only time to fire his mufket twice, when he was knocked down, and unfortunately fell over the larboard fide, 200 Indians immediately maffacring him with clubs and ftones. Of the 61 men who had engaged in this expedition, 49 faved themfelves by fwimming to the barges of the frigates, but the remaining number fell a facrifice to the relentlefs fury of thefe favages, and all the others were grievoufly wounded more or lefs. M. de Lamanon, the philofopher and naturalift, was one of the number who loft his life on this occafion. Many of the Indians were killed or wounded in this conflict. M. de Vaujuas clofes his narrative of this event with the following general remark: "All thofe who were on fhore can bear witnefs, like me, that no violence, no imprudence on our fide provoked the attack of the favages. Our captain had, with refpect to this, iffued the moft ftrict orders, which no one difobeyed." Captain Edwards calls this ifland "Otutuela." The anchoring place was in S. lat. 14° 22'. E. long. 189° 1'. Peroufe's Voyage, vol. ii.

MAP, a plain figure, reprefenting the furface of the earth; or a part of it, according to the laws of perfpective.

A map is a projection of the furface of the globe, or a part of it, on a plane furface, reprefenting the forms and dimenfions of the feveral countries and rivers; with the fituation of cities, mountains, and other places.

Maps are either *univerfal* or *particular*.

Maps, *Univerfal*, are thofe which exhibit the whole furface of the earth, or the two hemifpheres.

Maps, *Particular*, are thofe which exhibit fome particular region, or part of the earth's furface.

Thofe of each kind are frequently called *geographical*, or *land-maps*, in contradiftinction to *hydrographical*, or *fea-maps*, reprefenting only the feas and fea-coafts; and properly called *charts*; which fee.

There are three qualifications required in a map: 1. That all places have their juft fituation with regard to the chief circles of the earth, as the equator, parallels, meridians, &c. becaufe on thefe depend many properties of regions, as well as celeftial phenomena. 2. That the magnitudes and forms of the feveral countries have the fame proportion as on the furface of the earth. 3. That the feveral places have the fame diftance and fituation with regard to each other, as on the earth itfelf.

For the foundation of maps, and the laws of projection, fee Perspective, and Projection *of the Sphere*.—The application of thefe principles and laws, in the conftruction of maps, is as follows.

Conftruction of a Map, the Eye being placed in the Axis.—Suppofe, *v. g.* the northern hemifphere to be reprefented with the eye on the point of the axis, *v. g.* the fouth pole: for the plane on which the reprefentation is to be made, we take the plane of the equator, and, from all the points of the furface of the northern hemifphere, conceive lines paffing through the plane to the eye; which points, connected together, conftitute the map required.

In this cafe, the equator will be the limit of the projection; the pole, the centre. The meridians will be right lines paffing from the pole to the equator: the parallels of latitude, &c. circles concentric with the equator; and all the other circles, and arcs of circles, as the horizon, vertical circles, &c. ecliptic, &c. conceived in that hemifphere, will be ellipfes, or arcs of ellipfes.

The better to apprehend the projection of the circles of the plane, conceive a radiant cone, whofe vertex is the eye, its bafe the circle to be reprefented, and its fides the rays paffing between the circle and the eye. Suppofe this cone cut by the plane, it is obvious, that, according to the various pofition of the cone, there will be a different fection, and confequently a different line of reprefentation.

For the Application of this Doctrine in Practice.——In a plane, *v. g.* a paper, take the middle point P (*Plate* I. *Geography*, *fig.* 4.) for the pole; and from this, as a centre, defcribe a circle of the intended fize of your map to reprefent the equator. Thefe two may be pitched on at pleafure, and from thefe all the other points and circles are to be determined. Divide the equator into 360°, and drawing right lines from the centre to the beginning of each degree, thefe will be meridians; whereof that drawn to the beginning of the firft degree, we fuppofe the firft meridian.

For the parallels.—There are four quadrants of the equator; the firft, 0.90; the fecond, 90.180; the third, 180.270; the fourth, 270.0; which, for the better diftinction, we will note with the letters A B, C D, B C, D A. Taking one of thefe, *v. g.* B A; from the feveral degrees of it, as alfo from 23° 30', and 66° 30' of it, draw occult right lines to the point D, marking where thefe lines cut the femidiameter A P C; and from P, as a centre, defcribe arcs paffing through the feveral points in A P C.—Thefe arcs will be parallels of latitude. The parallel at 23° 30' will be the tropic of Cancer, and that at 66° 30', the arctic circle. The meridians and parallels thus defcribed, from a table of longitudes and latitudes, lay down the places; reckoning the longitude of each place on the equator, commencing at the firft meridian, and proceeding to the meridian of the place; and for the latitude of the place choofing a parallel of the fame latitude: the point in which this meridian and parallel interfect, reprefents the place: and in the fame manner all the other places may be determined, till the map be complete.

For the ecliptic, half of which comes in this hemifphere, we have obferved, that it makes an ellipfis; fo that the points through which it paffes are to be found. The firft point, or that in which the ecliptic cuts the equator, is the fame with that in which the firft meridian cuts the equator, which is therefore diftinguifhed by the fign of Aries: the laft point of this half ellipfis, or the other interfection of the equator, and ecliptic, *viz.* the end of Virgo, will be in the oppofite point of the equator, *viz.* at 180°. The middle point of the ellipfis is that in which the meridian 90 cuts the tropic of Cancer. Thus we have three points of the ecliptic determined: for the reft, *viz.* for 1° and 15° of Taurus, 1° and 15° of Gemini, 1° of Leo, 1° of Virgo; the declinations of thofe points from the equator muft be taken from a table, and fet off in the map. See Declination, &c.

Thus, where the meridian of 13° cuts the parallel of 5°, that point will be 15 degrees of Aries. Where the meridian 26° cuts the parallel $11\frac{1}{2}$, will be the firft degree of Taurus; and fo of the reft. Thefe points, being all joined by a curve line, will be a portion of an ellipfis reprefenting the ecliptic.

Maps of this projection have the firft qualification above required; but they are defective in the fecond: the furface being ftretched farther, as it approaches nearer the equator. With refpect to the third, they are ftill farther erroneous. By

By this method may almoſt the whole earth be repreſented in one map, placing the eye, *v.g.* in the antarctic pole, and aſſuming for the plane of projection that of ſome circle near it, *v.g.* the antarctic circle. Nothing is here required beſides the former projection, but to continue the meridian, draw parallels on the other ſide of the equator, and complete the ecliptic; but this diſtorts too much for practice.

This projection is the eaſieſt: but that where the eye is placed in the plane of the equator, is preferred for uſe. It is, in effect, of the latter kind that maps are ordinarily made. The former are added to them, in ſmall, by way of ſupplement, to repreſent the intermediate ſpaces left between the two hemiſpheres.—Farther, as the ſituation of the ecliptic, with regard to the earth, is continually changing; ſtrictly ſpeaking, it has no place on the earth's ſurface: but is uſed to be repreſented according to its ſituation, at ſome certain moment; *viz.* ſo that the beginning of Aries and Libra may be in the interſections of the firſt meridian and equator.

Conſtruction of Maps, with the Eye in the Plane of the Equator.—This method of projection, though more difficult, is yet much more juſt, more natural, and more commodious, than the former. To conceive it, we ſuppoſe the ſurface of the earth cut into two hemiſpheres by the entire periphery of the firſt meridian, each of which hemiſpheres we repreſent in a diſtinct map. The eye is placed in the point of the equator 90° diſtant from the firſt meridian: and for the tranſparent plane, wherein the repreſentation is to be, we take the plane of the firſt meridian. In this projection, the equator is a right line, and the meridian, 90° diſtant from the firſt, is alſo a right line; but the other meridians, and all the parallels of the equator, are arcs of circles, and the ecliptic is an ellipſis.

The method is thus: From a point E as a centre (*fig.* 5.) deſcribe a circle according to the intended ſize of the map. This repreſents the firſt meridian, and its oppoſite; for drawing the diameter B D, there ariſe two ſemicircles, the one of which, B A D, is the firſt meridian, the other, B C D, its oppoſite, or the meridian of 180°. This diameter, B D, repreſents the meridian of 90 degrees, of which the point B is the arctic pole, and the point D the antarctic. The diameter A C, perpendicular to that B D, is the equator. Divide the quadrants A B, B C, C D, D A, each into 90 degrees; and to find the arcs of the meridians and parallels, proceed thus: divide the equator into its degrees; *viz.* 180 (as being indeed only half the equator); through theſe ſeveral diviſions, and the two poles, deſcribe arcs of circles, repreſenting meridians, as B 10 D, B 20 D, &c.—How to find centres for deſcribing thoſe arcs, ſee under the word CHORD. See alſo *Geometrical Conſtruction of the* GLOBULAR PROJECTION, infra.

Indeed the operation will be both more eaſy and accurate, if performed by a canon of ſemi-tangents.

Thus, by means of a ſector, divide the equator A C into two lines of ſemi-tangents E A and E C, which will repreſent the degrees of longitude. Then with the ſecant of 80°, as a radius, deſcribe the arc of the circle B 80 D, which repreſents a meridian cutting the plane of projection at an angle of 80°; with the ſecant of 70° deſcribe the arc B 70 D, which repreſents a meridian cutting the plane of projection at 70; and proceed in the ſame manner with the reſt of the meridians, which are uſually drawn at every 10° of longitude, as the parallels are at every 10° of latitude.

To deſcribe the parallels, the meridian B D muſt be in like manner divided into 180 degrees; then through each of theſe diviſions and the correſponding diviſions of the quadrants A B, C B, deſcribe arcs of circles. Thus ſhall we have parallels of all degrees, with tropics, polars, and meridians.

The parallels may be drawn with the tangents for radii, as the meridians are with the ſecants, 1010 repreſenting the parallel of 10°, with the tangent of 80°, that of 20 with the tangent of 70°, &c. The ecliptic may be deſigned two ways; for its ſituation over the earth may either be ſuch, as that its interſection with the equator may be over the place A; in which caſe the projection of its ſemicircles, from the firſt degree of Cancer, to the firſt of Capricorn, will be a ſtraight line, to be determined by numbering 23° 30′ from A towards B, and from the extreme of that numeration drawing a diameter through E; which line will be half the ecliptic in this ſituation, and may be divided, as before, into degrees, to which the numbers, ſigns, &c. are to be affixed. But if the ecliptic be ſo placed, as that its interſection with the equator is over the place A, in the firſt meridian, its projection in that caſe will be a ſegment of an ellipſis: whereof two of the points are A, C; a third, that wherein the meridian 90 cuts the tropic of Cancer. The other points muſt be determined in the manner laid down above; *viz.* by taking the declinations and right aſcenſions of 15° of Aries, 1° of Taurus, 15° of Gemini, &c. For where the parallels, according to their ſeveral degrees of declination, cut the meridians, taken according to the ſeveral right aſcenſions, thoſe points of interſection are the points of the 15° of Aries, &c. A curve line therefore being drawn, theſe will give the projection of the ecliptic.

Nothing then remains to complete the map, but to take the longitudes and latitudes of places from a table; and to ſet them off on the map; as was directed under the former method.

In this projection the whole ſurface of the earth may be repreſented in one map; if, inſtead of the plane of the firſt meridian, ſome other plane parallel to it, but very near the eye, be taken; for by this means the entire parallels and meridians will be deſcribed. But as this diſtorts the face of the earth too much, it is ſeldom uſed; and we rather make the two hemiſpheres in two diſtinct tables.

One great advantage in this projection is, that it repreſents the longitudes and latitudes of places, their diſtance from the pole and from the equator, almoſt the ſame as they really are on the earth. Its inconveniences are, that it makes the degrees of the equator unequal; being the greater as they are nearer the firſt meridian D A B, or its oppoſite B C D; and for this reaſon equal tracts of the earth are repreſented unequal; which defect may be in ſome meaſure remedied, by removing the eye far from the earth. And, laſtly, the diſtances of places and ſituation, with regard to each other, cannot be well determined in maps of this projection.

Conſtruction of Maps on the Plane of the Horizon, or wherein any given place ſhall be the centre or middle. Suppoſe, for inſtance, it is deſired to have London the centre of the map. Its latitude we will ſuppoſe to be 51° 32′. The eye is placed in the nadir. The tranſparent table is the plane of the horizon, or ſome other plane, if it is deſired to repreſent more than a hemiſphere. Take then the point E (*fig.* 6.) for London; and from this, as a centre, deſcribe the circle A B C D to repreſent the horizon, which you are then to divide into four quadrants, and each of theſe into 90 degrees. Let the diameter B D be the meridian, B the northern quarter, D the ſouthern; the line of equinoctial eaſt and weſt ſhews the firſt vertical, A the weſt, C the eaſt, or a place of 90 degrees from the zenith in the firſt vertical. All the verticals are repreſented by right lines drawn from the

the centre E to the feveral degrees of the horizon. Divide B D into 180 degrees, as in the former methods; the point in E B, reprefenting 51° 32′ of the arc B C, will be the projection of the north pole, which note with the letter P. The point in E D, reprefenting 51° 32′ of the arc D C (reckoning from C towards D), will be the projection of the interfection of the equator and meridian of London, which note with the letter Q; and from this, towards P, write the numbers of the degrees, 1, 2, 3, &c. As alfo from Q towards D, and from B towards P; *viz.* 51. 52, 53, &c. Then taking the correfponding points of equal degrees; *viz.* 99 and 99, 88 and 88, &c. about thofe, as diameters, defcribe circles, which will reprefent parallels, or circles of latitude, with the equators, tropics, and polar circles. For the meridians, firft defcribe a circle through the three points A, P, C. This will reprefent the meridian 90 degrees from London. Let its centre be M in B D (continuing to the point N, which reprefents the fouth pole), P N being the diameter; through M draw a parallel to A C; *viz.* F H, continued each way to K and L. Divide the circle, P H N F, into 360 degrees, and from the point P draw right lines to the feveral degrees, cutting K F H L; through the feveral points of interfection, and the two poles P, N, as through three given points, defcribe circles reprefenting all the meridians. The centres for defcribing the arcs will be in the fame K L, as being the fame that are found by the former interfection; but are to be taken with this caution, that for the meridian next B D N towards A, the moft remote centre towards L, be taken for the fecond, the fecond from this, &c. The circles of longitude and latitude thus drawn, infert the places from a table, as has been directed.

Conftruction of Maps on the Plane of the Meridian.—This projection is taught by Ptolemy, and recommended by him as proper for that part of the earth then known. In this the equator and parallels are arcs of circles, and the meridians arcs of ellipfes; the eye hanging over the plane of that meridian which paffes over the middle of the inhabited world. But in regard the defcription of thefe ellipfes is fomewhat perplexing, and becaufe this method feems calculated only for a part of the earth, it is not now ufed.

There is a fecond method, fomething akin to it, which reprefents the circles of latitude by right lines, and the meridians by arcs of ellipfes: as muft be the cafe, if lines be conceived to fall from the feveral points of each hemifphere perpendicularly on the plane of the firft meridian, and the eye be fuppofed at an infinite diftance from the earth, fo that all the rays emitted from the places of the earth to it may be accounted parallels, as well as perpendiculars to the plane of the firft meridian.

In his "Companion to a Map of the World," (London, 1794, 4to.) Mr. Arrowfmith has offered the following remarks on projection; and as they are immediately connected with the fubject of the conftruction of maps, we fhall here fubjoin them.

"As the earth is of a form approaching very near to a globe or fphere, it is evident that the only map which can truly reprefent the figure of the various countries, and their relative bearings and diftances, muft be delineated on the furface of a globe. But as globes of a fize proper to exhibit a map fufficiently accurate, and containing all the information that is neceffary or defirable, muft be very bulky, and very expenfive, it is neceffary to have more portable and cheaper maps, executed upon a flat furface; thefe, fince the art of copper-plate printing has been in ufe, have generally been made upon paper.

"It is obvious that fuch a map, wherein is attempted to reprefent upon a plane furface that which is really fpherical, muft depart confiderably from the truth; efpecially if it comprehends the whole, or a confiderable portion of the world. It has, therefore, been an object which has engaged the attention of the moft eminent geographers, to difcover a projection (or arrangement of the proportional parts of the map) which fhould be liable to the feweft errors.

"The moft natural method of reprefenting a fphere upon a plane feems to be to divide it into two equal parts, and infcribe each of them in a circle: but as the equator and the polar axis, which interfects that circle at right angles, and makes one of the meridians, muft be fuppofed equal in length to the half of the periphery (of which it is not quite two-thirds), it follows, of courfe, that the countries delineated upon or near thefe lines muft be reduced to fomewhat lefs than two-thirds of the fize of the countries of equal extent, which lie at the extremity of the circle; and that the lines drawn to meafure the latitude, which are parallel to each other, or nearly fo, muft, in order to preferve as nearly as poffible their proportional angles at the points of interfection with the meridian, form fegments of circles, of which no two are parallel or concentric.

"There may be as many different projections as there are points of view, in which a globe can be feen; but geographers have generally chofen thofe which reprefent the poles, at the top and bottom of the map: thefe, from the delineation of the lines of latitude and longitude, are called the ftereographic, orthographic, and globular projections." See Projection.

"I do not propofe to detain the reader with a defcription of all the projections; fome of which are fo numerous (for the purpofe of conftructing of maps) as to deferve being configned entirely to oblivion. But as projections of maps form a pleafing and inftructive exercife, and, indeed, indifpenfibly neceffary to the right underftanding of geography, by ftudents, I fhall defcribe the manner of conftructing the map that accompanies this work; but firft hint at the ftereographic projection. (The great geographer, d'Anville, has conftructed his map of the world upon this projection, adapting it to Caffini's fyftem of the figure of the earth, which makes the polar diameter longer than the equatorial.) Among the various pofitions affignable to the eye, there are chiefly two that have been adopted, wherein the eye is placed either in the point D (*fig.* 7.) or removed to an infinite diftance; and hence this projection is liable to the great error of diftorting the form of the countries, reprefented upon it, much more than is neceffary. The only advantage is, that the lines of latitude and longitude interfect each other at right angles.

"This being obferved by that excellent aftronomer, M. de la Hire (Hift. Acad. Sc. 1701), he invented a remedy for the inconvenience, by affigning to the eye a pofition at the point O (*fig.* 7.) the diftance of which, from the globe at D, is equal to the fine of 45°; and hence the right line, G O, which bifects the quadrant B C, alfo bifects the radius E C, and produces the fimilar triangles O F G, and O E I; and thus the other parts of the quadrant B C, and, in like manner, of the whole femicircle A B C, are reprefented in the projection nearly proportional to each other, and to the eye perfectly fo.

"This projection, as coming the neareft to a true reprefentation of the globe, is called the "Globular Projection;" it is equal to the ftereographic in point of facility, and vaftly fuperior to it in point of truth.

"*Geometrical Conftruction of the* Globular Projection.—From the centre C (*fig.* 8.), with any radius, as C B, defcribe a circle; draw the diameters A B, and 90, 90, (being careful to draw them at right angles), and divide them into nine

nine equal parts; likewife divide each quadrant into nine equal parts, each of which contains 10 degrees: if the fcale admits of it, every one of thefe divifions may be fubdivided into degrees: next, to draw the meridians, fuppofe the meridian 80° W. of Greenwich. we have given the two poles, 90, 90, and the point 80 in the equator, or diameter A B; defcribe a circle to pafs through the three given points, as follows; with the radius 90 C, fet one foot of the compaffes on the point 90, and defcribe the femicircles X X and Z Z; then remove the compaffes to the point 80 on the equator, and defcribe the arcs 1, 1, and 2, 2; where they interfect the femicircle, make the point as at 1 and 2, and draw lines from 2 through the point 1, till they interfect the diameter B A, continued, in E, then will E be the centre from which the meridian 90, 80, 90, muft be drawn, and will exprefs the meridian of 80° W. longitude from Greenwich. The fame radius will draw the meridian expreffing 140° W. longitude in like manner. Draw the next meridian with the radius C B, fet one foot of the compaffes in the point *d*, and defcribe the arcs *a a* and *b b*; then draw lines as before, which will give the point D, the centre of 90° W. longitude, and fo of all the reft.

"The parallels of latitude are drawn in the fame manner, with this difference, that the femicircles X X and Z Z muft be drawn from the points A and B, the extremities of the equator." See *Conftruction of Maps, with the Eye in the Plane of the Equator*, fupra.

"In the manner above-defcribed, with great labour and exactnefs, I drew all the meridians and parallels of latitude to every degree in two hemifpheres, which laid the foundation of the map now before us.

"We fhall now drop a few hints on the advantage and difadvantage of Mercator's projection.

"A method has been found to obviate fome of the difficulties attending all the circular projections by one, which, from the perfon who firft ufed it (though not the inventor), is called "Mercator's Projection." In this there are none but right lines; all the meridians are equidiftant, and continue fo through the whole extent; but, on the other hand, in order to obtain the true bearing, fo that the compafs may be applied to the map (or chart) for the purpofe of navigation, the fpaces between the parallels of latitude (which in truth are equal, or nearly fo) are made to increafe as they recede from the equator in a proportion which, in the high latitudes, becomes prodigioufly great.

"The great advantages peculiar to this projection are, that every place drawn upon it retains its true bearing, with refpect to all other places; the diftances may be meafured with the niceft exactnefs by proper fcales, and all the lines drawn upon it are right lines. For thefe reafons, it is the only projection in drawing maps or charts for the ufe of navigators." See CHART.

"Its only difadvantage is, that the countries in high latitudes are of neceffity increafed beyond their juft fize to a monftrous degree.

"Thus it appears, from this fhort view of three of the beft modes of projecting maps of the world upon a plane furface, that each of thofe which have been more particularly defcribed, is attended with advantages and difadvantages peculiar to itfelf; it is obvious, that the only means to acquire a juft idea of the various countries upon fuch a furface, is by a comparifon of two maps, one laid down on the Mercator's projection, and the other upon the beft of the Circular projections." See PROJECTION.

MAPS, *General*, are the hemifpheres; which are for the moft part conftructed ftereographically.

MAPS, *Rectilinear*, are thofe wherein both the meridians and parallels are reprefented by right lines, which by the laws of perfpective is impoffible; in regard there can no fuch pofition be affigned to the eye and the plane, as that the circles both of longitude and latitude fhall be right lines.

In the firft method above laid down, the meridians are right lines, but the parallels are circles: in the fifth, the parallels are right lines, and the meridians ellipfes. In all other perfpective methods, both kinds of circles are curves: one method indeed muft be excepted, wherein the meridians are right lines, and the parallels hyperbolas; as when the eye is placed in the centre of the earth, and the plane, through which it is viewed, is parallel to the firft meridian: but this method is rather pretty than ufeful.

Rectilinear maps are chiefly ufed in navigation, to facilitate the eftimate of the fhip's way. See CHART

Conftruction of particular Maps.—Particular maps of large tracts, as Europe, Afia, Africa, and America, are projected after the fame manner as general ones; only let it be obferved, that for different parts, different methods may be chofen. Africa and America, for inftance, as the equator paffes through them, cannot be conveniently projected by the firft method, but much better by the fecond. Europe and Afia are moft conveniently reprefented by the third; and the polar parts, or the frigid zones, by the firft.

To begin then, draw a right line on your plane, or paper, for the meridian of the plane over which the eye is conceived to hang, and divide it into degrees, as before, which will be the degrees of latitude. Then from the tables take the latitude of the two parallels, which terminate each extreme. The degrees of thefe latitudes are to be noted in the meridian; and through them draw perpendiculars, bounding the map towards north and fouth. This done, meridians and parallels are to be drawn to the feveral degrees, and the places to be inferted, till the map is complete.

For particular Maps of lefs extent. In maps of fmaller portions of the earth, the geographers take another method. Firft, a tranfverfe line is drawn at the bottom of the plane, to reprefent the latitude, wherein the fouthernmoft part of the country, to be exhibited, terminates. In this line, fo many equal parts are taken as that country is extended in longitude. On the middle of this fame line erect a perpendicular, having fo many parts as there are degrees of latitude between the northern and fouthern limits of the country. How big thefe parts are to be, may be determined by the proportion of a degree of a great circle to a degree of the parallel reprefented by the tranfverfe line at bottom. Through the other extreme of this perpendicular, draw another perpendicular, or a parallel to the line at bottom, in which are to be feen as many degrees of longitude as in the lower line, and thefe, too, equal to each other, unlefs the latitudes happen to be remote from each other, or from the equator. But if the loweft parallel be at a confiderable diftance from the equinoctial, or if the latitude of the northern limit go much beyond that of the fouthern; the parts or degrees of the upper line muft not be equal to thofe of the lower, but lefs, and that according to the proportion which a degree of the more northern parallel has to a degree of the more fouthern. After parts have been thus determined, both on the upper and lower line, for the degrees of longitude; right lines muft be drawn through the beginning and end of the fame number, which lines reprefent the meridians; then through the feveral

veral degrees of the perpendicular erected on the middle of the first transverse line, draw lines parallel to that transverse line: these will represent parallels of latitude. Lastly, at the points wherein the meridians of longitude and the parallels of latitude concur, insert the places from a table, as before directed. But though there are various modes of constructing these maps, they are, in general, defective, so as not to be applied with accuracy and facility to the purposes intended, in determining the courses or bearings of places, their distances, or both.

Suppose it were required to draw the meridians and parallels for a map of Britain. This island is known to lie between 50° and 60° of latitude, and 2 and 7° of longitude. Having therefore chosen the length of your degrees of latitude, you must next proportion your degrees of longitude to it. By the table of degrees of longitude corresponding to every degree of latitude, under Degree, you will find that in the latitude of 50°, the length of a degree of longitude is to one of latitude, as 39.054 is to 60; that is, a degree of longitude in lat. 50°, is somewhat more than half the length of a degree of latitude. The exact proportion may be easily taken by a diagonal scale; after which you are to mark out seven or eight of those degrees upon a right line for the length of your intended map. On the extremities of this line raise two perpendiculars, upon which mark out 10° of latitude for the height of it. Then, having completed the parallelogram, consult the table for the length of a degree of longitude in lat. 60°, which is found to be nearly one half a degree of latitude. It will be always proper, however, to draw a vertical meridian exactly in the middle of the parallelogram, to which the meridian on each side may converge; and from this you are to set off the degrees of longitude on each side. Then having divided the lines bounding your map into as many parts as can conveniently be done, to serve for a scale, you may by means of these set off the longitudes and latitudes with much less trouble than where curve lines are used. This method may always be adopted where a particular kingdom is to be delineated, and will represent the true figure and situation of the places with tolerable exactness. The particular points of the compass on which the towns lie with respect to one another, or their bearings, cannot exactly be known, except by a globe or Mercator's projection. Their distances, however, may thus be accurately expressed, and this is the only kind of maps to which a scale of miles can be truly adapted.

The Rev. T. Bowen has just published an excellent apparatus for describing the lines of longitude and latitude on maps, on a scale adapted for the use of schools. In like manner, these lines may be described on maps of any size with unerring accuracy.

The apparatus consists of a scale and a pair of compasses sufficiently large to describe the proposed lines, with a book to explain the method of using them. The short lines at each end of the scale represent the equators, the meridians, the north, the south, the east, and west lines graduated; from which the outlines of the maps are to be constructed, and the degrees laid down. The lines extending the whole length of the scale on the other side, contain the centres of the different circles which compose the lines of longitude and latitude mathematically found. The radius of each line to be described on the map, is the distance between that line and its corresponding number on the scale; consequently, by placing one limb of the compasses on the central point on the scale (when adjusted according to the directions given), extending the other to its corresponding number on the meridian, and then moving it from east to west, the parallel of latitude is formed; from north to south through its corresponding number on the equator, and the line of longitude is described.

For an abstract of La Croix's paper on the projection of maps, see Pinkerton's Geography, vol. i. Introd.

For Maps of Provinces, or small tracts, as parishes, manors, &c. we use another method, more sure and accurate than any of the former. In this, the angles of position, or the bearings of the several places, with regard to one another, are determined by proper instruments, and transferred to paper. This constitutes an art apart, called *surveying*.

Maps, *the Use of*, is obvious from their construction. The degrees of the meridians and parallels shew the longitudes and latitudes of places, and the scale of miles annexed, their distances; the situation of places, with regard to each other, as well as to the cardinal points, appears by inspection, the top of the map being always the north, the bottom the south, the right hand the east, and the left the west; unless the compass usually annexed shew the contrary.

Maps *of Estates*, in *Agriculture*, such plans or outlines of lands as are necessary to direct their management in the most easy and economical manner. In an useful work on "Landed Property," it is advised that the different distinct parts or farms into which they are divided, should be outlined, coloured, and introduced on a general map, as well as each separately delineated, more particularly on a small pocket one, so as to shew the farms with distinctness, or the lands intended to be laid into them, with the wood-lands, waters, &c. &c. that are in hand. The pocket maps should exhibit at once the outlines, the names, and the contents of the different fields, or pieces of land of which they are severally constituted, which by being coloured according to occupancy, the several fields of the existing farms (or intermixed parts of farms intended to be united), though scattered, may be readily distinguished. And "if separate columns of contents be indorsed on the backs of the maps, one of them of the intended farm, the other of the existing farms or parts of farms, with their totals subjoined; all the doubts and perplexities which are wont to arise on large estates, from the intermixture of farm-lands, will be avoided."

And these maps of farms should be of a portable size, as ten inches by eight, and be bound up in volumes corresponding to the general maps; so that the superintendant-manager in going over any part of the estate, may have with him the maps that belong to it. Each map should be folded double, and be hung in loosely within flexible covers, by a guard or slip of paper pasted on the back, in order that when opened each may lie flat and fair, and be conveniently portable when shut.

Maps, *Geognostic*. The idea of exhibiting in maps, by means of signs or illumination, the principal geognostic features of a given tract of country, the aspect of its surface, the nature of its rocks, their alternation and relative position, is as new as the science which teaches us to distinguish from each other the manifold materials that compose the crust of the earth as far as we are acquainted with it. Several methods have been lately adopted for accomplishing the above object; of all which that of colouring the spaces occupied by the different rocks appears by far the most convenient. It is this method which has been improved and carried to a high degree of precision by the celebrated Werner, who has happily removed all those obstacles which hitherto prevented its general adoption. We are indebted to to profeffor Jamefon for an account of the Wernerian method of colouring maps, communicated in the firft volume of the "Tranfactions of the Wernerian Society" lately publifhed.

The following rules fhould be obferved in illuminating maps for the above purpofe: 1. In every cafe fuch colours are to be ufed as will allow the ground-work of the map or delineations of the mountains to appear through them diftinctly. 2. The colours fhould agree as nearly as poffible with nature; they fhould correfpond with the moft common colour of the rock, or, at leaft, differ from it as little as poffible, and agree with the tranfition fuite of the colours. 3. The ufe of all bright colours muft be avoided. 4. The colours muft not be too pale or too deep, and they ought to be laid on as much as poffible of the fame intenfity: perfectly dark and light coloured rocks are exceptions to this rule. 5. The colours of mountain-rocks muft form fuites or tranfitions, in order to exprefs the tranfitions of the rocks into each other; at the fame time they muft be fufficiently diftinct from each other.

The following colours are employed by Werner for diftinguifhing the particular rocks:—quartz; reddifh-white, inclining a little to yellow:—topaz-rock; pale brick red:—granite; pale cochineal red, approaching carmine-red:—white-ftone; pale flefh-red:—gneifs; lilac-blue:—mica flate; pearl-grey:—primitive clay-flate; greenifh-grey, approaching to blue:—alum-flate; pale blueifh-black, approaching to grey:—fletz-flate; deep afh-grey:—grey-wacke-flate and grey-wacke; greenifh-grey, paffing into yellow:—trap-rocks, fuch as granular primitive trap, green-ftone, green-ftone flate, hornblende flate, blackifh-green inclining to blue:—bafalt; greenifh-black:—porphyry-flate; pale greenifh-black:—amygdaloid; pale greenifh-black, flightly inclining to brown:—ferpentine; pale piftachio-green:—talc and chlorite-flate; pale grafs-green:—porphyry; pale reddifh-brown, flightly inclining to yellow:—fienite; pale reddifh-brown, inclining to blueifh, that is, clove-brown paffing into blueifh-red:—granular primitive lime-ftone; pale Berlin-blue:—compact primitive lime-ftone; fmalt-blue, faintly inclining to red:—tranfition lime-ftone; indigo-blue, flightly inclining to grey:—fletz-lime-ftone; pale blueifh-grey:—chalk; blueifh-white:—calcareous tuf; fmoke-grey:—gypfum; pale fky-blue:—rock-falt, and rocks from which falt-fprings iffue; pale verdigris-green:—coal-formation; pale blackifh-brown, approaching to yellowifh-brown:—alum-earth and brown coal; liver brown:—conglomerate and clay-ftone; pale orange-yellow, flightly inclining to reddifh-brown:—fand-ftone; ftraw-yellow:—loam and clay; yellowifh-grey paffing into ochre-yellow:—iron-clay and calamine; pale ochre-yellow:—turf and peat; liver-brown ftreaks:—bog-iron ore; ochre-yellow ftreaks. All thefe rocks may, likewife, be diftinguifhed by particular figns or fymbols; for which, if they fhould be deemed ufeful, we refer to the Wernerian Tranfactions.

Not only particular rocks, but alfo formation fuites, may be reprefented in colours. Thus, the flate formation fuite will be red fhaded into blue, the blue into grey; this latter into green, and the green into yellow. The inflammable foffils, fubordinate to thefe formations, will be dark brown. The lime-ftone formation fuite will be blue, which will pafs into grey, and laftly into white. The falt and gypfum formation fuites, which are allied to the preceding, will be greenifh-blue and blueifh-green; the trap fuite, greenifh-black and blackifh-green, fhaded into blue; the porphyry fuite, light brown; the talc and ferpentine fuite, pale yellowifh-green.

The relative pofitions of the different rocks, Werner expreffed in the following manner: boundaries of fuperimpofed rocks are to be marked with a broad line of the fame colour as the rock, only darker; and where we are uncertain as to the fuperpofition of the rock, the junction is to be merely ftreaked. Beds, when they appear at the furface, fhould have their boundaries diftinguifhed by a broad, but darker, line of the fame colour as that of the rock of which they are compofed. When the beds are inclined, the lower fide fhould be marked with a broad line of the fame colour as the bed itfelf; but its upper fide by a broad dark line of the colour of the rock that refts on it.

Veins are reprefented by lines drawn in the direction of the veins of the diftrict. Metalliferous veins fhould be pointed out by red lines; and veins filled with mountain-rocks, by lines of the fame colour as the rock of which they are compofed.

The dip of the ftrata is expreffed by black coloured arrows, whofe length fhould be in proportion to the angle of inclination, and their direction to the point of the compafs towards which the ftrata dip or incline. When the ftrata are vertical, or under any angle from 90° to 80°, they are marked by two crofs lines, thus ×; horizontal ftrata, or ftrata under any angle from 0 to 10°, by two lines croffing each other at right angles, and having a head of an arrow at each extremity. The intermediate angles from 80° to 10° are marked by fimple arrows, one-eighth, one-fourth, and half an inch in length. The arrow one-eighth of an inch in length intimates that the ftrata are inclined at any angle between 80° and 60°; the arrow one-fourth of an inch in length, that the ftrata are inclined at any angle between 60° and 40°; the arrow half an inch in length, that the ftrata are inclined at any angle between 40° and 10°. The firft or fhorteft arrow is meant to point out ftrata inclined under an angle of 70°; the fecond arrow, ftrata under an angle of 50°; the third arrow, ftrata under an angle of 25°. Probably, according to Mr. Jamefon, an equally convenient mode would be, to mark the angle of inclination alongfide the arrow, and proportion its fize to the length of the map. Thus, if the map were on a large fcale, the arrow might be three-quarters of an inch long; if on a fmaller fcale, half an inch, or even one-quarter of an inch in length. The higheft points on a mountain-range, Werner diftinguifhes by a crofs, +; a level, by a figure refembling a door, ∩; and a fhaft, by a fmall parallelogram, ▭.

MAPANA, in *Geography*, a lake of Thibet, from which the Ganges is faid to iffue. The head of this majeftic river is compofed of two ftreams, which run weftward; and the fouthernmoft of thefe branches runs through two lakes, the firft of which is named Mapana, and the fecond "Lanken."

MAPANIA, in *Botany*, a name in Aublet, of whofe derivation or meaning no account is given, but which is retained by Juffieu and Vahl. Aubl. Guian. v. 1. 47. Vahl. Enum. v. 2. 391. Juff. 27. Lamarck Illuftr. t. 37.—Clafs and order, *Triandria Monogynia*. Nat. Ord. *Calamariæ*, Linn. *Cyperoideæ*, Juff.

Gen. Ch. *Cal.* Involucrum many-flowered, of three very large, fpreading, equal, ovate, acute, fmooth leaves, much longer than the flowers. Perianth inferior, of fix ovate, acute, concave leaves. *Cor.* none. *Stam.* Filaments three, inferted into the receptacle, capillary, longer than the calyx; anthers oblong, quadrangular, of two cells. *Pift.* Germen ovate, fuperior; ftyle thread-fhaped, equal to the ftamens; ftigmas three, awl-fhaped. *Peric.* none. *Seed* one, roundifh, naked.

Eff. Ch. Involucrum of three leaves. Perianth inferior, of fix leaves. Corolla none. Seed one, naked.

1. M. *fylvatica*. Aubl. t. 17.—Native of marfhy forefts, about

about the rivers Aroura and Orapu in Guiana, where Aublet found it flowering in June. One of his fpecimens is before us. *Root* perennial, creeping, firm, throwing up feveral fimple, triangular *ftems*, about two feet high, rough with minute harfh points or prickles, and clothed at the bafe with feveral fheathing, imbricated, membranous, reddifh *fcales* or *leaves*. The reft of the *ftem* is naked, but its top is crowned with the three fpreading *involucral leaves*, each five or fix inches long, obovate, pointed, ribbed, entire, fmooth, green, and foliaceous, in whofe centre is ftationed a round feffile head of feveral *flowers*. Vahl, who had examined a fpecimen, juftly remarks, that the leaves of the calyx are not toothed, as Aublet defcribes them, but entire.

MAPELLA, in *Geography*, a town of Italy, in the department of the Mincio.

MAPLE, in *Botany*. See ACER.

MAPLE *Tree*, in *Agriculture*, the common name of a tree of the deciduous kind, cultivated for the purpofes of timber and ornament in plantations and other grounds. There are feveral fpecies and varieties of this tree, as the great maple or fycamore, the common or fmaller maple, the afh-leaved Virginia maple, the Montpelier maple, the plane-tree like Norway maple, the fcarlet flowering maple, the fugar maple, the Tartarian maple, the Italian maple, the Pennfylvanian mountain maple, and the Cretan maple.

And there are two varieties of the great maple or fycamore, one with broad leaves and large keys, the other with variegated leaves: the latter, when blended in large plantations, affords a pleafing variety. This tree is frequently known by the name of *fycamore*, *mock plane*, and *plane tree*. See SYCAMORE.

The common maple is a tree of much humbler growth than the great maple, and by no means fo ornamental; it may, however, be ufeful in extenfive plantations and pleafure grounds. It is alfo very good for timber, being clofe in the grain of the wood. When cut down, it affords an excellent underwood.

The afh-leaved maple fhould be made ufe of in fituations that are not much expofed to the winds, as it is faid to be apt to be fplit by them. The wood is foft and brittle, and of courfe lefs ufeful as timber.

The Montpelier maple is chiefly ufeful for the variety it affords in ornamental plantations.

And the Norway maple is principally ufeful for affording fhelter, and alfo as a timber tree. There are two varieties, one with variegated or ftriped leaves, and the other with cut leaves.

There are two varieties of the fcarlet-flowering maple, the Virginian fcarlet-flowering maple, and fir Charles Wager's maple. Both of them are chiefly propagated for the fake of the flowers, which are of a fcarlet colour. The fort called fir Charles Wager's, produces larger clufters of flowers than the other, on which account it is in more eftimation.

In America, the inhabitants tap the fugar maple in the fpring, and boil the liquor, which affords an ufeful fugar. The fycamore, the afh-leaved, and the Norway maples alfo abound with a faccharine juice, from which fugar might probably be prepared with advantage in fome fituations.

The Italian maple is common in many parts of Italy, and is a lofty tree, and, from its having a fpreading head, adorned with large and beautiful foliage, deferves the attention of ornamental planters. It may be alfo ufeful as a timber tree, in fome cafes.

The Cretan maple is only ufeful as an ornamental tree. There is a variety of it, in which the leaves continue green moft part of the year, when fheltered, and which is denominated the evergreen Cretan maple.

It may be noticed, that all the forts and varieties of the maple are of eafy cultivation; each being capable of being raifed by feed, and many of them by layering, cuttings, and budding. They thrive well in moft foils and fituations, provided they be not too moift; the common forts fucceeding the beft in fuch as are deep and inclined to moifture, but not hard or ftiff; and the American kinds in thofe that have a dry and rather clofe ftate of mould or foil. In raifing them in the firft method, as the feeds do not, in all the forts, ripen well in this country, the beft way is to procure them from the places where they grow naturally. A cool fhady place is the moft fuitable for this purpofe. The mould being made fine, and nurfery beds marked out four feet wide, with length proportionate to the quantity, in thefe the feeds are to be regularly fown in the autumn, fifting over them the fineft mould to the depth of half an inch. When the plants are come up, they muft be kept clean from weeds, and frequently watered during fummer. In the fpring following, the ftrongeft may be drawn out and planted in nurferies, in rows two feet afunder, and at the diftance of a foot from each other in them, leaving the others to gain ftrength. In the fecond fpring, thefe alfo muft have the fame culture; and they may remain in the nurfery, without any other trouble than keeping the ground clean in the fummer, digging between the rows in the winter, and taking off all ftrong and irregular fide-fhoots, till they are fit to be planted out. The trees raifed in this way grow fafter, and arrive at greater heights, than thofe from layers; but they do not in general produce fuch quantities of flowers, which makes the latter mode more eligible for thofe who want thefe plants for low fhrubbery ufes. In thefe cafes, they fhould always have four or five years growth before they are finally planted out. It is, however, advifed by fome, that the feeds of the common or Norway maples fhould not be put into the foil immediately after becoming ripe, but be dried and preferved in fand till February or March, as the feafon may prove favourable, when they may be fowed in drills or beds eighteen inches broad, with alleys the fame width, and covered three quarters of an inch thick with mould. In the following February or March, the alleys fhould be dug, and the roots of the plants cut about five inches under ground, which may be eafily performed by means of a fharp fpade, drawing the plants out where too thick. Thefe may be replanted in any good mellow foil, in rows eighteen inches afunder, and eight or nine inches from each other in the rows. In October, when the plants in general will be about two feet high, both the feedlings and thofe that were tranfplanted fhould be raifed, fhortening their tap-roots, cutting off any crofs lateral branches, and removing them into rows two feet and a half apart, and fifteen inches diftant in them, in order that they may continue for a year or two. Remove them again at the fame feafon the fucceeding year, and plant them in rows five feet afunder, and two and a half from each other, that they may continue four years. Thefe will now be from twelve to fifteen feet high; and if required of a ftill larger fize, they may be removed, and planted again eight or ten feet afunder; when, any time after two and not exceeding eight or ten years, they may be finally planted out where they are to remain. The ufe of removing thefe trees frequently when young is, that they are apt naturally to grow with tap-roots, which this management prevents, and makes the plants root better, and become more eafy and certain in their growth, when tranfplanted at a large fize. The timber forts are beft raifed from the feeds, without being removed at all. Though all the

the ſpecies are capable of being propagated by layers, it is never practiſed for the common maple. In this method the young ſhoots may be laid down at any time, in the autumn, winter, or early in the ſpring; but the firſt is probably the beſt. By the ſame time in the following year they will have ſtruck root, and have become good plants, when the ſtrongeſt may be ſet out in the places where they are to remain; while the weakeſt may be planted in the nurſery, in the ſame manner as the ſeedlings, for a year or two, in order to gain ſtrength.

But in propagating by cuttings, though all theſe trees are capable of it, it is a method chiefly practiſed on the aſh-leaved and Norway maples, as they take root this way more readily. The cuttings ſhould be taken from the bottom part of the laſt year's ſhoots early in October, and be planted in rows in a moiſt ſhady place. In the ſpring and ſummer following they ſhould be watered, as often as dry weather makes it neceſſary, and be kept perfectly clean from weeds. In the autumn they will be fit to remove into the nurſery; though if the cuttings are not planted too cloſe, they may remain in their ſituations for a year or two longer, and then be finally ſet out without the trouble of being previouſly planted in the nurſery. Theſe trees are alſo to be raiſed by budding and grafting, but as the other methods are more eligible, theſe are ſeldom or ever practiſed, except for the variegated ſorts and the large broad-leaved kind. The latter indeed is to be continued in no other way than by budding it on ſtocks of the common ſycamore; as the ſeeds, when ſown, afford only the common ſycamore. But the ſeeds of the variegated kinds produce variegated plants; which renders the propagation of theſe ſorts very expeditious where plenty of ſeed can be had. But where it is not to be obtained, in order to propagate theſe varieties, recourſe muſt be had to budding; in performing which ſome plants of the common ſycamore one year old, are to be taken out of the ſeed-bed and placed in the nurſery in rows a yard aſunder, and about a foot and a half diſtant from each other in the rows. The ground muſt e kept clean from weeds all ſummer, and be dug, or, as the gardeners call it, *turned* in the winter; and the ſummer following the ſtocks will be of a proper ſize to receive the buds, which ſhould be taken from the moſt beautifully ſtriped branches. The beſt time for this operation is about Auguſt; as, if it is done earlier the buds will ſhoot the ſame ſummer, and when this happens a hard winter is apt to kill them. Having budded the ſtocks the middle or latter end of Auguſt, the eyes, or buds, being inſerted on that ſide the ſtock which faces the north towards the beginning of October, the baſs by which it was tied may be removed, as it will begin to pinch and confine the bark as well as the bud too much. In the ſpring, juſt before the ſap begins to riſe, or the trees begin to ſhoot, the head of the ſtock ſhould be cut off in a ſloping direction juſt above the inſerted; by theſe means, and that of rubbing off ſuch ſhoots as come from the ſtocks, the ſhoot from the inſerted bud will be rendered more ſtrong and healthy. The trees thus raiſed may remain in their ſituations for a year or two longer, or be tranſplanted into the places where they are intended for, in the autumn or ſpring following; care being conſtantly taken to keep the land between the rows well dug, ſo as to prevent their being injured by the growth of coarſe weeds, and the ſide buds trimmed from their ſtocks occaſionally.

In reſpect to the time of planting, the autumn ſeaſon is upon the whole the beſt time for planting theſe and other deciduous trees, when they are ſtrong and well rooted; yet when very young they are apt to be injured by froſts, and to be thrown out of the ground in ſevere winters, when planted in that ſeaſon of the year. In ſuch caſes the ſpring is better.

MAPLE *Sugar*, a kind of ſugar made from a ſpecies of the maple, called by Monſieur Sarazin, *acer Canadenſe ſaccchariferum fructu minori*. M. Sarazin, a phyſician at Quebec, intending to inquire at large into the nature of this ſort of ſugar, obſerved that there were four ſpecies of maple common in the places where it was made, all which he ſent over to the garden at Paris. One of theſe ſpecies, diſtinguiſhed from the reſt by the ſmallneſs of its fruit, is called the ſugar-maple; this grows to ſixty or eighty feet high, and its juice, which is very redundant in the months of April and May, is eaſily made into a very good ſugar. They procure this juice from the tree by piercing a hole into the trunk, and placing veſſels to receive it. This juice, being evaporated, yields about one-twentieth part of its own weight in pure ſugar. A middle-ſized tree, of this ſpecies, will yield ſixty or eighty pints of this juice, without receiving any damage as to its growth; and much more than this may be drawn, but then the tree manifeſtly ſuffers for it.

M. Sarazin obſerved ſome very remarkable particulars in regard to the ſaccharine quality of this juice, without which it never had it in the proper perfection. 1. The tree, at the time that the juice is drawn out, muſt have its bottom covered with ſnow; and if it is not naturally ſo, the Indians know ſo well the neceſſity of it, that they always bring ſnow from elſewhere, and heap it up round it. 2. This ſnow muſt afterwards be melted away by the ſunſhine, not gradually thawed by a warm air. 3. There muſt have been a froſty night before the opening of the hole in the trunk. It is remarkable that theſe circumſtances are ſuch as cuſtom and experience alone could have pointed out, ſince they ſeem contrary to reaſon; and ſo it is in many of the operations in chemiſtry, where the moſt ſeemingly rational means fail, while thoſe which ſhould ſeem quite contradictory to reaſon ſucceed. It is obſerved, that if the juice of the maple be not in a condition to become ſaccharine while the ſnow lies at its root unthawed, that it almoſt immediately becomes ſo on the melting of the ſnow, and its penetrating into the earth. Mem. Acad. Par. 1730.

The juice of the maple, unboiled, has been drank as an antiſcorbutic; the ſugar and molaſſes, which are ſaid to be leſs ſweet than thoſe extracted from the ſugar-cane, are ſuppoſed to be more medicinal in diſorders of the breaſt.

MAPLE *Iſlands*, in *Geography*, two ſmall iſlands of America, in lake Superior, near the E. coaſt. N. lat. 46° 44'. W. long. 84° 54'.

MA-POU-HOTUN, a town of Corea; 46 miles E.N.E. of Peking.

MAPOURIA, in *Botany*, Aublet. Guian. v. 1. 175. t. 67, a ſhrub of Guiana, found by Aublet on the banks of the river *Sinemari*, flowering in September. It is called by the natives *Maypouri-crabli*, becauſe the *maypouris*, or wild cattle, are fond of the leaves and branches, and thence the above name was conſtructed. The *root* throws up many ſoft, brittle, juicy *ſtems*, about eight or nine feet high, clothed with a greeniſh bark. *Leaves* oppoſite, each pair croſſing the next, oval, pointed, entire, pliable, ſmooth and ſhining, with one rib, and numerous tranſverſe parallel veins; each leaf eight inches long at moſt, and about half as broad, ſupported by a *footſtalk* an inch in length. *Stipulas* intrafoliaceous, in pairs, ovate, large, deciduous. *Panicle* terminal, trichotomous, many-flowered, with oppoſite minute *bracteas* at its ſubdiviſions. *Flowers* ſmall. *Calyx* ſuperior, of five teeth. *Corolla* white, of one petal, its

its limb in five fegments, about twice the length of the tube. *Stamens* five, as long as the limb, inferted into the tube between the fegments. The mouth of the tube is befet with white hairs. *Germen* inferior, oval; ftyle fimple, as long as the ftamens; ftigma of two oblong lobes. *Fruit* unknown.

Juffieu, Gen. 205. prefumes this plant to be of the fame genus with the *Simira* of Aublet, t. 65, and perhaps with his *Palicourea*, t. 66. The latter is the *Stephanium* of Schreber, of which we fhall fpeak in its proper place, and was referred by Solander to *Muffaenda*. They appear to us very near to *Pfychotria*, at leaft to fome plants referred to that genus. They all belong to the *Pentandria Monogynia* of Linnæus, and to the feventh fection of Juffieu's great natural order of *Rubiaceæ*.

MAPPARIUS, an officer among the Romans, who in the public games, as thofe of the circus, and of the gladiators, gave the fignal for their beginning, by throwing an handkerchief (*mappa*) which he had before received from the emperor, conful, prætor, or other fupreme officer then prefent.

MAPPIA, in *Botany*, received its name from Schreber, in memory of Mark Mappi, M.D. formerly a phyfician and botanift at Strafburgh, who in 1691 publifhed a 12mo. catalogue of the plants in the public garden of that univerfity. He alfo publifhed, as Profeffor, fome inaugural differtations on tea, coffee and chocolate, and on the rofe of Jericho. His *Hiftoria Plantarum Alfaticarum* appeared in 1742, after the author's death, by the care of Dr. Ehrmann, of the fame place. This is a quarto volume of 335 pages, with a few plates, difpofed in alphabetical order. Mappi died in 1701, at the age of 69. Schreb. Gen. 806. Mart. Mill. Dict. v. 3. (Soramia; Aubl. Guian. 552. t. 219. Juff. 433. Lamarck Illuftr. t. 463.)—Clafs and order, *Polyandria Monogynia*. Nat. Ord. uncertain, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, roundifh, concave, permanent fegments, coloured on the infide. *Cor.* Petals five, roundifh, fpreading, fcarcely longer than the calyx, fupported by fhort claws. *Stam.* Filaments numerous, (about 60,) the length of the corolla, capillary, dilated upwards, inferted into the receptacle; anthers ovate. *Pift.* Germen fuperior, globofe; ftyle cylindrical, incurved; ftigma capitate. *Peric.* Berry ovate, of one cell. *Seed* folitary, large, ovate, involved in a thick vifcid tunic.

Eff. Ch. Calyx of five leaves. Petals five. Berry fuperior, of one cell. Seed folitary, involved in a vifcid tunic.

1. M. *fcandens*. (Soramia guianenfis; Aubl. Guian. t. 219.)—Found by Aublet on the banks of the river Sinémari, bearing flowers and fruit in May. The *ftem* is fhrubby, with tuberculated branches, and twines about the trunks of trees, climbing to their fummits, where the ultimate fhoots become very long and pendant, bearing alternate, obovate, entire, fmooth, flefhy *leaves*, fix inches long at the utmoft, and about half as wide, each fupported by a *footftalk* an inch in length. *Flowers* white, in fmall, lax, axillary or lateral, corymbofe clufters. *Stamens* about 60, according to Aublet's French defcription, which is always the moft authentic; the Latin one, made from it by other hands, fays 160, an error which Schreber has incautioufly adopted. *Berry* red, the fize of a cherry, crowned with the permanent ftyle; its fubftance firm, flefhy, flightly acid. The tunic of the *feed* is thick, white and vifcid. Permanent *calyx* flefhy and deep red.

MAPROUNEA, the barbarous name in Aublet, who gives no account of its meaning or derivation, for a fmall tree of Cayenne, the *Aegopricon betulinum*, Linn. Suppl. 63. 413. Sm. Plant Ic. t. 42. (Maprounea guianenfis; Aubl. Guian. 895. t. 342.) See AEGOPRICON. We beg leave to correct one of our predeceffors as to the origin of this name. It feems to be formed of αἴξ, *a goat*, and κόπρος, *dung*, in allufion to the fhape of the fruit, which refembles the dung of goats or fheep. It ought rather therefore to have been written *Aecopricon*.

MAPUNCO, in *Geography*, a town of Africa; in the kingdom of Angola.

MAQUALBURY, a river of Africa, which runs into the Atlantic, about 10 miles S.E. from the Scherbro. N. lat. 6° 50'. W. long. 10° 30'.

MAQUEDA, a town of Spain, in New Caftile; 32 miles S.W. of Madrid.

MAQUILAPA, a town of Mexico; 15 miles S.W. of Chiapa.

MAR, in *Rural Economy*, a provincial term fignifying a river or fmall lake.

MARA, in *Mythology*, a name of the Hindoo god of love, *Kama*; which fee.

MARA, *Madame*, in *Biography*, born Schmeling, a native of Germany, arrived in England in 1760, with her father, during childhood, when fhe acquired a very correct pronunciation of our language, which is never done by foreigners but in youth. She could not be more than nine or ten years old when fhe came hither, yet fhe was then a notable performer on the violin; and as there were feveral children at that time in London of uncommon proficiency on different inftruments, a concert was made for them at the Little Theatre in the Haymarket, in which they feverally difplayed their talents; Baron and Schmeling on the violin; Mifs B. on the harpfichord, and Cervetto on the violoncello.

After ftaying two or three years in England, and, we believe, performing on the violin in different parts of the kingdom, to the great furprife and pleafure of the lovers of mufic, fhe returned with her father to Germany, and we heard no more of her till the year 1771, when we received from a very intelligent mufical friend at Hambro' the following letter.

"At Berlin there is now a German opera finger, that aftonifhes every one who hears her. People who have been a long time in Italy, and who have formerly heard Fauftina, Cuzzoni, and Aftrua, affure me that fhe furpaffes them all. Indeed, when I heard her at Leipfic, two years ago, I was enraptured. I never knew a voice fo powerful, and fo fweet at the fame time; fhe could do with it juft what fhe pleafed. She fings from G to E *in altiffimo* with the greateft eafe and force, and both her *portamenta di voce*, and her volubility are, in my opinion, unrivalled; but when I heard her, fhe feemed to like nothing but difficult mufic. She fung at fight, what very good players could not play, at fight, on the violin; and nothing was too difficult to her execution, which was eafy and neat. But, after this, fhe refined her tafte, infomuch that fhe was able to perform the part of "Tifbe," in Haffe's opera, which requires fimplicity and expreffion, more than volubility of throat; and in this fhe perfectly fucceeded, as Agricola, the tranflator of Tofi's "Arte del Canto," and our beft finging mafter in Germany, affures me. The king of Pruffia, a great connoiffeur, was aftonifhed at it. Her name is Schmeling, fhe is about twenty-four years of age, and was in England, when a child, where fhe played the violin; but fhe quitted that inftrument, and became a finger, by the advice of Englifh ladies, who difliked a *female fiddler*." The next year, in travelling through Germany, this account was fully corroborated by feveral intelligent muficians who had heard her; and previous to our arrival at Berlin, we were informed that his Pruffian majefty,

majefty, who, at firft, with difficulty was prevailed on to hear "a German finger," exclaimed, "I fhould as foon expect to receive pleafure from the neighing of my horfe." However, after his majefty had heard her fing one fong, he was faid to have fought among his manufcript mufic for the moft difficult airs in his collection, in order to try her powers, as much as to gratify his own ear; but fhe executed, *at fight*, whatever he commanded her to perform, in all ftyles, as well as if fhe had practifed each of thefe compofitions during her whole life.

When, afterwards, we had an interview with her at Berlin, we find in our journal the following account of her perfon: "She is fhort, and not handfome, but is far from having any thing difagreeable in her countenance; on the contrary, there is a ftrong expreffion of good nature impreffed upon it, which renders her addrefs very engaging. Her teeth are irregular, and project too much, yet, altogether, her youth and fmiles taken into the account, fhe is rather agreeable in face and figure."

We found that fhe had preferved her Englifh; indeed fhe fometimes wanted words, but having learned it very young, the pronunciation of thofe which occurred was perfectly correct. She was prevailed upon by a friend, who had procured us this interview, to fing foon after our entrance. She began with a very difficult *aria di bravura*, by Traetta, which we had heard before at Mingotti's in Munich. She fung it admirably, and fully anfwered the great ideas which we had formed of her abilities, in every thing but her voice, which was a little cloudy, and not quite fo powerful as we expected. However, fhe had a flight cold and cough, and complained of indifpofition; but with all this, her voice was fweetly toned, and fhe fung perfectly well in tune. She has an excellent fhake, a good expreffion, and a facility of executing and articulating rapid and difficult divifions, that is aftonifhing.

Her fecond fong was a *larghetto*, by Schwanenburg, of Brunfwick, which was very pretty in itfelf; but fhe made it truly delightful by her tafte and expreffion: fhe was by no means lavifh of graces, but thofe fhe ufed were perfectly fuited to the ftyle of the mufic, and idea of the poet.

After this, fhe fung an *andante*, in the part which fhe had to practife for the enfuing carnival, in Graun's "Merope;" and in this acquitted herfelf with great tafte, expreffion, and propriety.

In a fecond vifit to Mademoifelle Schmeling, fhe favoured us with feveral fongs of uncommon rapidity and compafs; her powers in thefe particulars were truly aftonifhing; but we found that fhe was frequently compelled to abufe thofe powers by the airs which were given her to execute, in which fhe had paffages that degraded the voice into an inftrument; indeed fuch as a player of tafte would be afhamed to execute on any inftrument. Breaking a common chord into common *arpeggios* of no meaning, fuch as may be feen in the fecond allegros of Corelli's firft and third folos, does not feem to reflect much honour, either upon a compofer or performer. Geminiani, in transforming thefe folos into concertos, omitted thefe violin *folfeggios* or exercifes for the hand in private practice.

We found in this fecond vifit to Mademoifelle Schmeling, a little want of brightnefs in the middle of her voice; and we then imagined it poffible for her ftill to improve in finging adagios, though not in the execution of allegros. She did not then indeed feem to be placed in the beft fchool for advancement in tafte, expreffion, and high vocal finifhing.

In the fpring of 1784, Mademoifelle Schmeling arrived in England under the name of Mara, having been fome time married to a performer on the violoncello, in the fervice of prince Henry, brother to the king of Pruffia, with whom fhe was connected in 1772, when we faw her at Berlin. There had been a correfpondence opened between this admirable finger and the proprietors of the Pantheon, who wifhed much to engage her as a fucceffor to the Agujari; but the king of Pruffia would not let her quit his capital; and after fhe had executed an article which engaged her in the fervice of the Pantheon, and money had been remitted to her to defray the expences of her journey, on his Pruffian majefty difcovering that fhe intended to quit his fervice *a la fourdine*, he had her arrefted and thrown into prifon; and it was with extreme difficulty that fhe contrived, by means of our ambaffador, fir James Harris, to let the proprietors of the Pantheon know that fhe could not fulfil her engagement, and entreated them, for God's fake, not to write to her any more. She, however, very honeftly returned the money that had been advanced to her by the proprietors of the Pantheon.

At length, however, fhe obtained her difmiffion, and engaged herfelf to perform fix nights at the Pantheon; 1784 was not an aufpicious year for the Pantheon. The diffolution of parliament and general election happening foon after her arrival, the audiences to which fhe fung were not very numerous, nor had her performance the effect it deferved, till fhe fung at Weftminfter Abbey; where fhe was heard by near three thoufand of the firft people in the kingdom, not only with pleafure, but extacy and rapture.

In 1786, the opera regency, after a bankruptcy, being fettled, and fir John Gallini inverted with the power of ruining himfelf and others, "Didone Abbandonata," a pafticcio ferious opera, was brought out previous to the arrival of Rubinelli, and had confiderable fuccefs. But this muft be wholly afcribed to the abilities of Madame Mara, who fung on our opera ftage for the firft time. Indeed, fhe was fo fuperior to all other performers in the troop, that fhe feemed a divinity among mortals. The pleafure with which fhe was heard, had a confiderable increafe for her choice of fongs; which, being in different ftyles by Sacchini, Piccini, Mortellari, and Gazzaniga, were all feverally encored during the run of the opera; a circumftance which we never remember to have happened to any other finger, except Manzoli.

The manner in which fhe fung Handel's oratorio mufic in Weftminfter Abbey, and continued to fing it elfewhere, had gained her more applaufe and favour with the Englifh public, than her aftonifhing execution.

This great vocal performer, except a few fhort excurfions to the continent in fummer, continued to refide in England, and to enjoy the favour and admiration of the public, till the latter end of 1802; when fhe returned to Germany, and is faid to have been received at Berlin, and heard with the fame enthufiafm which fhe had excited 30 years ago. We have done ample juftice to the talents of this extraordinary finger on many occafions. But we cannot quit this article without a few difcriminative reflections, not to injure or extend her fame, but to manifeft our fincerity as well as candour in drawing characters.

We have never been able to difcover of whom the Mara, after quitting the violin, learned to fing; but we are inclined to think that it was not of an Italian mafter; and that if it was of a German, it was of an inftrumental performer. Perhaps the whole of her ftudy in finging was to imitate the inftruments of great performers. In the humble ftate in which fhe had travelled with her father, fhe could have had no opportunities of hearing fine Italian finging by performers of the firft order. And it has often been obferved by thofe accuftomed to exquifite Italian finging, that her cadences, expreffion, and execution, however excellent, favoured more of inftrumental perfection than vocal. Her recitative was not fpoken with Italian energy; and when we confider what a good performer fhe had been, early in life, on the violin, and what a good player fhe afterwards became on the piano-forte; or, in other words, what an excellent mufician fhe was, and with what facility fhe could execute all kinds of difficulties, we have been often furprized at the little novelty, variety, and refined tafte, there was in her clofes. Indeed it will perhaps be faid, that fhe brought here, and left behind her, in this country, fcarcely a new vocal paffage; as all other great fingers, fuch as in our own memory, Mingotti, Elifi, Manzoli, Pacchierotti, Rubinelli, and Marchefi had done; but all thefe remarks only confirm old proverbs, that neither human nature, nor human art, are ever to be perfect, and that we cannot have every perfection in one and the fame individual.

MARA, in *Geography*, a mountain of Malacca, near the Straits. N. lat. 1° 55′. E. long. 104 39′.

MARAASCIAN, a town of Turkeftan, on the Sirr; 130 miles S.S.E of Andugar.

MARABAD, a town of Perfia, in the province of Segellan; 120 miles N N.E. of Zareng.

MARABEA, a town of Arabia, near the Red fea, formerly a fea-port, but fince the harbour has been filled up, moft of the inhabitants have fettled at Loheia; eight miles N. of Loheia.

MARABONA BAY, a bay on the N. coaft of Jamaica. N. lat. 18° 31′. E. long. 77° 21′.

MARABOU, an inlet of the harbour of Alexandria, in Egypt, fituated at its weftern extremity, commanding one of the channels, and feparated from the continent by a range of rocks 140 yards in extent. The length of the iflet is not above 300 yards, and its breadth 150. The French, during their abode in Egypt, conftructed a ftrong regular fort on this iflet round a tower, which was formerly a mofque.

MARACA, a fmall ifland in the Atlantic, near the coaft of Guiana. N. lat. 2′. W. long. 51° 26′.—Alfo, a town of South America, in the government of Caraccas; 50 miles S.W. of Leon de Caraccas.

MARACAGUACO, a branch of the Amazons' river, which joins the main ftream; 40 miles S.W. of Pauxis.

MARACAJA, in *Zoology*. See FELIS *Tigrina*.

MARACAIBO, a province of South America, in the government of Caraccas, furrounding a lake of the fame name; bounded on the N. by the Caribbean fea; on the E. by Venezuela; on the W. by the government of Rio de la Hache, dependent on the vice-royalty of New Granada; and on the S. by Varinas, and the kingdom of Santa Fé. This province covers but a fmall extent from E. to W., but ftretches more than 100 leagues towards the fouth. The foil of Maracaibo is, for a certain diftance from the capital, ungrateful; on the eaftern bank the lake is dry, unhealthy, and unfruitful. On the weft bank of the lake, the land does not begin to be fertile at more than 25 leagues to the fouth of the city. All that lies to the fouth of the lake may vie with the beft lands of South America. The population is eftimated at 100,000. In this province are 300 European regular troops, 100 artillery-men, and 810 militia.—Alfo, a lake of this province, lying from N. to S., communicating at one extremity with the fea. Its length from the bay to its moft fouthern receſs, is, according to Oviedo, 50 leagues, its greateft breadth 30, and its circumference upwards of 150. This lake may have owed its formation to the flow and gradual excavation occafioned by numerous rivers, which, flowing from E., W., and S., here terminate their courfe. It is eafily navigated, and carries veffels of the greateft burden. All the produce and provifions of the interior, intended for confumption or fhipping at the town of Maracaibo, are conveyed by the rivers which difcharge themfelves into this lake. Hurricanes are not unfrequent in this lake, and yet there is always a kind of undulation on the furface of the water, fo that, on particular occafions, its waves are fufficiently agitated to bury under them the canoes and fmall craft. At this time the waters of the fea force themfelves into the lake, and give a brackifh tafte to it as far as Maracaibo; but at all other times it is frefh and fit for drinking as far as the fea. The baths which are ufed there, and which the intenfe heat of the country renders indifpenfible, are attended with very falutary effects. All the different kinds of fifh furnifhed by the rivers of South America abound in this lake. To the N.E. of it, in the moft barren part of the borders, and in a place called "Mena," there is an inexhauftible mine of mineral pitch, which, mixed with fuet, is ufed for graving veffels. The bituminous vapours iffuing from this mine are eafily inflamed, and in the night luminous corrufcations are vifible, which refemble lightning, and which are denominated the lanterns of Maracaibo, becaufe they ferve for a light-houfe and compafs to the Spaniards and Indians who navigate the lake. The fterility, and alfo the noxious atmofphere of the borders of the lake, difcourage culture and population. The Indians are fo unhealthy, that they prefer dwelling on the lake itfelf to taking up their abodes on its borders. The Spaniards found on this lake feveral villages, built without order, and without apparent defign, but with folidity. Hence they gave them the name of "Venezuela," a diminutive of Venice, which they have not retained, but which has fince been applied to the whole province. Four of thefe villages remain, and the Indians who inhabit them have a church, which is under the care of a curate, who is entrufted with the charge of adminiftering fpiritual aid among the aquatic Indians. The great refource and chief employment of thefe people is the hunting of wild ducks, which they take by thrufting their heads into empty calabafhes, clofed fo that they may fee without being feen, and fwimming to the place where the ducks are, which they lay hold of by the legs, before they are alarmed, and tying them to their belts, thus bring them to the fhore.

The goodnefs of the foil in the weftern part has induced fome Spaniards, regardlefs of the infalubrity of the air, to fix their habitations there, in order to raife cocoa and provifions. Thefe fettlements, which were very much difperfed, were not able to command fufficient funds for laying the foundation of a village, much lefs of a city. There is but one chapel, placed nearly in the centre of the fcattered habitations, and a curate for performing divine fervice, and adminiftering the facrament. The fouthern extremity of the lake is uncultivated and uninhabited. The northern part is quite as hot as the other parts, but much more healthy.—Alfo, a town or city which is the capital of the province of the fame name, fituated on the left bank of the lake to the weft, at the diftance of about fix leagues from the fea, on a fandy foil, and in a hot dry climate, chiefly experienced from March to October; but in July and Auguft the air feems to proceed from a furnace. The only antidote is to bathe in the lake; and endemial diforders are unknown. The thunder-ftorms and torrents are here terrible; and if they fail, earthquakes certainly follow. Although many houfes are built of lime and fand, and with confiderable tafte, moft of them are meanly covered with reed, and there is no water but that which is derived from the lake, which is falubrious, though not pleafant, efpecially in March and April, when the ftrong breezes impregnate it with fea-fpray. The principal part of the city is on the fhore of a fmall gulf, one league in depth, which

which forms the lake towards the weſt. The other part is to the north, in the neck of the lake, which at this place is three leagues wide, whence it begins to extend towards the ſouth. The point where the city begins is called "Maracaibo Point;" that where the gulf commences "Point Arića," ſituated almoſt oppoſite to "Point St. Lucia." According to an enumeration in 1801, there were about 22,000 inhabitants; and they were increaſed by the Spaniſh refugees from St. Domingo. With this acceſſion, the population was raiſed to about 24,000 perſons, who are diſtributed into four claſſes; the nobility, conſiſting of about thirty families; white planters, compoſed of Europeans or Creoles, who apply to agriculture, navigation, commerce, the fiſheries, &c. and live comfortably; ſlaves and freemen, who exerciſe all kinds of trades, joiners, tailors, ſhoe-makers, carpenters, maſons, and ſmiths. The ſlaves do not exceed 5000. The habit of failing on the lake encourages the ſpirit of navigation, and many of the natives become ſeamen. Even in the dry Savannas they contrive to feed numerous herds; and the youth are celebrated for intelligence and ingenuity; but the inhabitants are rather noted for want of probity. The women are fond of the harp, which reſounds in the ſtreets in the evening. In their youth they are diſtinguiſhed by their modeſty, and, when married, are faithful affectionate wives and excellent mothers, directing their attention to domeſtic cares, and the education of their children. Here is only one church, aided by a chapel of eaſe, and a convent of Franciſcans. At Maracaibo they adore a virgin, which bears the ſurname of "Chiquinquira," which was the name of a village in the kingdom of Santa Fé, where ſhe made her firſt appearance. Her paſſion is to paint herſelf on diſh-clouts, and in the midſt of filth. A temple, on the diſcovery of her in 1586, was dedicated to her; and, as the fabulous tradition reports, a fountain roſe under the altar where ſhe was placed. She communicated to its waters miraculous virtues, which have given to her permanent reputation among the Spaniards. The image of this virgin is placed in the chapel of eaſe of St. Juan de Dios, where ſhe is invoked by all mariners as their imaginary protectreſs. The foundation of this town was laid, in 1571, by captain Alonſo Pacheco, an inhabitant of Truxillo, under the name of New Zamora, now known only under that of Maracaibo. At the entrance into this port is a bar of quick-ſand, ten or twelve feet under water, which excludes large veſſels, and admits ſmall ones with difficulty, and not without the conduct of a ſkilful pilot. As ſoon as the bar is cleared, there is plenty of water and a good harbour, which is defended by three forts. The manufactures and merchandiſes that are brought hither from places near the lake are put on board Spaniſh ſhips that come hither to purchaſe them. Maracaibo is the ſeat of a governor, who enjoys the ſame ſalary, and exerciſes the ſame functions, as the governor of Cumana. This place is very convenient for ſhip-building: 270 miles E. of Carthagena. N. lat. 10° 30′. W. long. 71° 46′. Depons' Travels in South America.

MARACANA, a town of Braſil, in the government of Para, on a river which runs into the Atlantic; 80 miles N.N.E. of Para. S. lat. 0° 27′. W. long. 49°.

MARACANA, in *Ornithology*, the name of a bird of the parrot-kind, but larger than the common ſpecies, and covered all over with blueiſh-grey feathers. It is very common in the Braſils. See PSITTACUS *Cinereus*.

The natives alſo call another bird of the parrot-kind by the ſame name, which is of a fine green on the head, neck, and back, but the crown of the head looks a little blueiſh; the tail is mixed of red and a blueiſh-green; the under part being red, as is alſo the under part of the wings; at the origin of each wing, it has alſo a red ſpot; and on each ſide of the head a brown one. The noiſe this bird makes is oe, oe, oe. See PSITTACUS *Severus*.

MARACANDA, in *Ancient Geography*, a very conſiderable city of Aſia, and capital of Sogdiana, which was captured by Alexander the Great, who, after leaving a ſtrong garriſon there, burnt and laid waſte all the plains. See SAMARCAND.

MARACAPA, in *Geography*, a town of South America, and capital of a diſtrict of the ſame name, in the province of Cumana; 42 miles W. of Cumana.

MARACAXAO, in *Ornithology*. See FRINGILLA *Melba*.

MARACAY, in *Geography*, a beautiful new village of South America, in the government of Caraccas, ſituated in the rich vales of Aragoa, 40 miles S.W. of Caraccas; famous for the culture of chocolate. The induſtrious inhabitants, moſtly Biſcayans, have been computed at more than 8000, and the vicinity is crowned with numerous plantations of cotton, indigo, coffee, and grain.

MARACCI, LEWIS, in *Biography*, a learned Italian, was born at Lucca in the year 1612: in his youth he applied himſelf moſt diligently, and with great ſucceſs, to the ſtudy of the eaſtern languages, particularly to the Arabic. His ſkill in this tongue led to his appointment to the profeſſorſhip of Arabic in the college of wiſdom. He was alſo ſelected by pope Innocent XI. as his confeſſor, which mark of high confidence and honour would have been followed by a cardinal's hat, but the humility of Maracci led him to decline that diſtinction. He died in the year 1700, at the great age of eighty-eight. He had a conſiderable ſhare in editing the "Arabic Bible," which was publiſhed at Rome in the year 1671, in three volumes folio: he is known alſo for a work which he printed in Padua but two years before his death, entitled "Alcorani Textus Univerſus Arabicè et Latinè," in two vols. folio. This verſion is accompanied with notes, a refutation of the Mahometan doctrines, and a life of the Pſeudo-Prophet. The work, though not wholly free from errors, is highly applauded by the learned. Maracci was author alſo of "The Life of Father Leonardi," the founder of the congregation to which he belonged, and of numerous other pieces.

MARACU, in *Geography*, a river of Braſil, which runs into the Atlantic, S. lat. 2° 40′. W. long. 45° 31′.

MARADECANUM, a town of Hindooſtan, in the circar of Cicacole; 15 miles N.E. of Tickely.

MARÆNA, in *Ichthyology*. See SALMO *Maræna*.

MARAGA, MARAGHA, or *Mirga*, in *Geography*, a town of Perſia, in the province of Adirbeitzan; 30 miles S. of Tabris. N. lat. 37° 20′. E. long. 46° 22′.—Alſo, a town of Egypt, on the left bank of the Nile, the environs of which are ſaid to yield the beſt wheat in Egypt; 6 miles S. of Taha.

MARAGAL, a town of Perſia, in Adirbeitzan; 42 miles S. of Tabris.

MARAGHA, a town of Syria, in the Deſert, where an obſervatory was erected by order of Hulaku, one of the deſcendants of Jenghiz Khan, and furniſhed with inſtruments for aſtronomical obſervation; 75 miles E.S.E. of Aleppo.

MARAGNON. See MARANON.

MARAH, or MARRA, a town of Syria, in which the Roman Catholics have a church, and the Greeks a church and convent; 15 miles N.E. of Damaſcus.

MARAHBUTS, or MARABOUTS, derived from a word which ſignifies a monk, or a man engaged to the performance of his vow, denote Mahometan prieſts, who are diſperſed through various parts of Africa. Thoſe of the Mandingo nation

nation apply themſelves, beſides religious matters, to the ſtudy of phyſic, as far as it depends on mere experience, without entering into the inveſtigation of the cauſes of diſeaſes. They are alſo often called upon by the kings and chiefs to give their opinion in caſes of law and equity. Moſt of them are well verſed in the Arabic language of the Mauritanic dialect, and they are the only people of letters among the blacks; for none of the black nations about Senegal and Gambia have even an alphabet, much leſs any writings in their own languages. The ſelling of charms is ſaid to conſtitute the greateſt part of their revenue; and the more reputation any one of them has acquired, the dearer is it ſold. Theſe charms uſually conſiſt in nothing but a few lines taken from the Koran, written on a little piece of paper, which, after being nicely ſewed up in leather or cloth, are worn by the purchaſers about their necks. They are deſigned to protect and defend them in danger; but as one charm has only the power of preſerving them from one kind of danger, they are obliged to have many of them; ſo that many of the blacks are covered with them in different parts of the body; and they have ſuch a ſtrong faith in them, that when they are ſurpriſed in the night-time by an enemy, they will not take up arms for their own defence, though in the moſt imminent danger, till they have dreſſed themſelves with theſe charms, and then they will meet him undauntedly. This faith in charms, however, is a corruption of the Mahometan religion; and the Moors, who live on the north ſide of the river Senegal, obſerving it in its purity, make no uſe of them.

The Marahbuts of the black nations, as well as thoſe of the Moors, are alſo the principal merchants, and the moſt opulent people among them, and the gum trade on the river Senegal is chiefly carried on by thoſe of the Moors. The Marahbuts are alſo the only people who can travel with any ſafety into diſtant kingdoms, which no layman can well do without running the riſk of being made a ſlave. Their religious profeſſion protects them every where; they are even reſpected among thoſe nations who are not Mahometans; and they are conſidered by them as a godly and virtuous people, and men of wiſdom. They make proſelytes every where to the Mahometan religion, and are induſtrious in ſpreading it all over Africa. Some Marahbuts of the Foolah nation who viſit Senegal, are pretty well verſed in the Old Teſtament, and are partly acquainted with the inſtitutes of the new one. The Marahbuts reaſon very well on ſuch ſubjects as they are acquainted with, but their manner, like that of the eaſtern nations, is that of adducing parables or ſimiles in their arguments, which do not always bear the ſtricteſt reſemblance to the caſe in hand; though they are very perſuaſive with ſuch people as are not capable of inveſtigating the points in which they differ from the caſe in queſtion. Their converſation is inſtructive and pleaſing. The Marahbuts of the Moors are more learned and ingenious in every reſpect than thoſe of the black nations. Phil. Tranſ. vol. lxxiii. p. 90.

MARAI, a town of Hindooſtan; 45 miles S.W. of Allahabad.

MARAJO, an iſland between the mouths of the Amazons and Para rivers, reſembling in its form an oval and triangle; about 160 miles in its greateſt length, and 120 in its greateſt breadth.

MARAJON, a town on the eaſt coaſt of the iſland of Marajo; 24 miles N.W. of Para.

MARAISAH, a town of Tunis, near the ſea, with the remains of a ſmall harbour.

MARAKUNDA, a town of Africa, in the kingdom of Badelu.

MARALDI, James Philip, in *Biography*, a learned mathematician and aſtronomer, was born at Perinaldo, in the county of Nice, in the year 1665. It is not known where he was educated, but at the age of twenty-two we find him at Paris, purſuing his maturer ſtudies under his uncle, the celebrated Caſſini, to whom he implicitly reſigned the direction of his purſuits. When Caſſini found that the young man's advancement in ſcience, his extraordinary diligence, and above all his accuracy, had qualified him to become an uſeful aſſiſtant in his aſtronomical labours, he, by the leave of the Royal Academy of Sciences, aſſociated him with himſelf in making obſervations on the celeſtial bodies. He ſoon opened the way to celebrity, by important diſcoveries with regard to the planets, particularly with reſpect to Jupiter: he found likewiſe that the parallax of the planet Mars was leſs by one ſecond, than had been determined by Caſſini in 1672. He ſpent the whole of the year 1674 in obſervations on the planet Saturn, and ſhewed how the diſappearance of the ring, at that particular period, confirmed the theory of Huygens. He beſtowed incredible induſtry in perfecting the tables of Jupiter's ſatellites, and found that the eclipſes of theſe bodies were of different durations, even when the diſtance of their nodes was the ſame. He applied himſelf to the conſtructing a catalogue of the fixed ſtars, and by his long and accurate attention to this object, became ſo well acquainted with theſe bodies, that on being ſhewn any one of them, however ſmall, he could immediately tell to what conſtellation it belonged, and its preciſe place in the conſtellation. Maraldi would ſometimes relax in his aſtronomical labours, and apply ſteadily to objects of natural hiſtory, on which ſcience he drew up a number of intereſting papers, which were inſerted in the different volumes of the memoirs of the Academy of Sciences, of which diſtinguiſhed ſociety he was a member. In the year 1700, he was employed by Caſſini in prolonging the French meridian to the northern extremity of France, and had a very conſiderable ſhare in that important undertaking. When his buſineſs was finiſhed, he paid a viſit to Italy, where the aſtronomers gladly availed themſelves of his advice and aſſiſtance in making their obſervations. At Rome, on the invitation of pope Clement XI., he aſſiſted at the aſſemblies of the congregation then ſitting in that city, for the purpoſe of reforming the calendar. He alſo took a part in conſtructing the great meridian line at the baths of Diocleſian. While at Rome he had a fine opportunity of obſerving an eclipſe of the fourth ſatellite of Jupiter, from which he was led to the concluſion, that its inclination is three minutes leſs than that fixed by Caſſini. He returned to France in 1703, with a rich treaſure of ſubjects in natural hiſtory, chiefly collected at Verona, which he preſented to the Academy of Sciences. In 1718 he was employed, with three other academicians, in prolonging the French meridian to the ſouthern extremity of that kingdom. Amidſt his various labours the greateſt part of his time was occupied within the walls of the obſervatory of Paris, where he was inceſſantly employed in aſtronomical purſuits, and in completing his catalogue. This laſt great work he did not live to finiſh; he died in December 1729, in the ſixty-fifth year of his age. He is characterized as a man of great ſeriouſneſs, integrity, and purity of morals, and as poſſeſſing an intereſting ſimplicity of manners. He publiſhed nothing but papers in the tranſactions of the academy: theſe, however, are very numerous and very valuable, and are to be found in almoſt every volume that was printed between the years 1698 and 1730. Moreri.

MARAMBAYA, in *Geography*, a ſmall iſland near the coaſt of Brazil. S. lat. 23° 10'.

MARA-

MARAMER, a town of Morocco, near Cape Cantin, encompaffed with old walls, but not ftrong either by nature or art; 9 miles from Saffi.

MARANA, John Paul, in *Biography*, was born of a noble family at or near Genoa in the year 1642. He received an education adapted to the fphere of life in which he moved, and being led to think and feel upon political fubjects, he was, at the age of twenty-feven, involved in the confpiracy of Raphael della Torre to deliver Genoa to the duke of Savoy. On this account he was thrown into prifon, where he remained four years. On his liberation he employed himfelf in writing an account of this confpiracy, and of the war between the republic and the duke of Savoy, and took a journey to Spain for the purpofe of collecting documents. When the work was finifhed, it was feized by the fpies of government, and examined, nor cou'd he get it returned for publication. In 1681 he abandoned his country and went to France, where he recompofed his work, and publifhed it in the year 1682, under the title of "La congiura da Rafaello delle Torre, con le moffe della Savoia contra la Republica di Genova." Marana is chiefly known as an author by the "Turkifh Spy," written in the French language, which has given birth to feveral imitations, on the fame model, though the original is not much fought after. He lived at Paris in a ftate of decent mediocrity till the year 1689, when he returned to Italy, where he died in about two years. Moreri.

Marana, in *Botany*, a name by which fome authors have called the ftramonium, or thorn-apple, a plant kept in fome gardens.

MARAND, in *Geography*, a town of Perfia, in the province of Adirbeitzan; 42 miles N. of Tauris.

MARANHAO, or Maranon, a jurifdiction of South America, in Brazil, belonging to the Portuguefe, who firft fettled here in 1599, upwards of 60 years after the difcovery. Its name is derived from an ifland at the mouth of three rivers, about 42 miles in circumference, which is fertile and well inhabited. The French feized on the ifland in 1612, and built a town called "St. Luis de Maranhao," but the Portuguefe recovered it out of their poffeffion. It is now very ftrong, having a caftle built on a rock towards the fea, which commands a very convenient harbour.

It is the fee of a bifhop, under the archbifhopric of St. Salvador de la Baya. The ifland is difficult of accefs, on account of the rapidity of the three rivers by which it is formed, fo that it can be vifited only at particular feafons, and with proper winds. There are two other lefs confiderable towns. The natives have about 27 hamlets, confifting each of four large huts, which form a fquare in the middle, from 300 to 500 paces in length, and about twenty or thirty feet in depth; all thefe are built of large timber, and covered from top to bottom with leaves, fo that each may contain from two to three hundred inhabitants. The air is ferene, feldom incommoded with ftorms, exceffive drought, or moifture, except during the periodical rains from February to June. The foil is rich, and produces every thing in perfection, without labour or manure. The inhabitants go naked, but paint their bodies and faces of various colours, and cover their hands and arms with a variety of feathers: the children, though born white, acquire an olive colour by being anointed with oils. They are ftrong and healthy, live to a great age, and are feldom afflicted with difeafes. Their only weapons are bows and arrows, in the ufe of which they are dextrous; but they are fierce and cruel, efpecially to their prifoners. The capital, St. Filipe, or St. Luis de Maranhao, is fituated in S. lat. 2° 30'. W. long. 45° 30'.

MARANO, a town of Italy, in Friuli, on the coaft of the Adriatic; containing about 1000 inhabitants, with a garrifon; 18 miles S. of Udina. N. lat. 45° 50'. E. long. 13° 50'.

Marano, or *Mariano*, a town of Italy, in the Veronefe; 8 miles N.N.W. of Verona.—Alfo, a town of Naples, in Lavora; 6 miles N.W. of Naples.

MARANON, or Maragnon, called alfo the river of the *Amazons* (fee Amazon), is celebrated as the moft diftinguifhed river not only in South America, but in the whole world. Of this river we have already given fome account under the article Amazon; but it deferves, on account of its magnitude and length, as well as the fertility and commerce that are diffufed along its fhores, a more particular and ample notice. Condamine, whofe account of this river we have curforily mentioned, computed its navigation at 1000 maritime leagues, or 3000 miles; to which recent difcoveries enable us to add at leaft 4 or 500 leagues: fo that if the countries, through which it purfues its courfe, were poffeffed by induftrious and populous nations, a fhip of 4 or 500 tons might afcend this wonderful river to the extent of 4500 miles of navigation. As the courfe of the Maranon, for more than one-third of its progrefs, is from north to fouth, it confiderably exceeds the whole breadth of South America; but eftimated in a line nearly direct, the length on a map will be found to be about 2500 geographical miles. If we thus eftimate the Kian of China, it will be found to reach 2000 miles, and the Ob of Siberia 1900. The Miffouri of North America may probably be eftimated at 2000 miles. But the pre-eminence of the Maranon has been very much increafed by recent difcoveries. This prodigious river, this torrent-fea, as it has been called, is not only fuperior in the length, but in the breadth and depth of its majeftic courfe; and receives on all fides, as tributaries, rivers of fuch power, that any one would enrich the defarts of Africa, and might fpread fertility, trade, and civilization, throughout a wide empire. Where the Beni joins the Maranon, it is half a league in breadth, (the Spanifh league being four Britifh miles;) the Tunguragua or falfe Maranon from the weft, the Llavari or Madera from the fouth, and the Negro from the north, are all rivers of this furprifing defcription. In fhort, through more than one-half of the great continent of South America, almoft every advantage of a maritime fhore might be diffufed by the Maranon, and its confluent ftreams. We fhall here avail ourfelves of the abftract given by Mr. Pinkerton, of the principal difcoveries that have recently been made, with regard to the fource and tributary rivers of the Maranon. Near its fource this river is called the Apurimac, which rifes to the fouth of the mineral mountains of Cailloma, perhaps in the lake of Vilque, as laid down by La Cruz, S. lat. 16° 10'; but probably ftill more to the fouth, perhaps even 17°; for after being joined by the Monigote or Panguana, in Cailloma, it is fo deep, when it enters the province of Canes and Canches, that a bridge is already neceffary. This bridge is probably that mentioned by Alcedo, on the high-road between Lima and Cuzco, fupported by ropes, and eighty "varas" in length, being almoft due weft of Cuzco, and which paffes the real Apurimac, according to La Cruz, while the Vilcamayo is on the eaft of Cuzco. After running two leagues below this bridge, it burfts through the chain of the Andes amidft precipices of incredible height, and which fupply numerous ftreams. The chief rivers which join the Maranon are as follow: the river of Pampas or Charcas from the weft, at 13° 10'; the Vilcamayo, a great river, nearly equal to the Apurimac or Maranon, at 12° 15': this river, like the others, has feveral names, according to the provinces through which it paffes, fuch as

Quillabamba,

Quillabamba, Urubamba, &c. The Mantaro, or river of Jauja, fo called from the province it pervades, but by La Cruz erroneoufly ftyled the ancient Maranon, joins the Maranon at 12° 6′, and feems to propel the chief river towards the north-eaft, the courfe having previoufly been towards the north-weft. The great river Paucartambo, called by La Cruz Ynambari, joins the Maranon at 10° 45′; the Perene, which rifes about two leagues from Tarma, runs through that town, and receives many ftreams from the heights of Bombom and Pafco, having joined it on the oppofite fide or weft, at 11° 13′. From the confluence of the Perene to that with the beautiful river Pachitea, at 8° 26′, that is an interval of 2° 52′, or 172 geographical miles, though by numerous windings increafed probably to 500, the Maranon receives no lefs than 40 copious rivers; but more particularly two of prodigious power, the Paucartambo already mentioned, and the Beni, the moft remote fprings of which lie eaft of the province of Sicafica, in about 19° of latitude. This river runs from fouth to north, with fome inflections, receiving various rivers from the mountainous territory which it interfects; among the moft remarkable of which is the Coroyco, iffuing from the province of La Paz, and entering it on the weft. The Beni, purfuing its courfe in 13° of latitude, throws off a branch, in an eaftern direction, which enters a confiderable lake, named Rogagado, that extends upwards of 10 leagues E.W., and of 5 N.S. From the eaftern fide of this lake rifes an arm, which runs to the Mamori; and three others are thrown off in a northern direction, *viz.* the Yutay, the Tefi, and the Coari, which purfuing a north-eaft courfe, empty themfelves into the Maranon. The Beni, having fupplied this arm, flows to its incorporation with the Apurimac, which it enters with an aperture of half a league, and by the name of Para. Three leagues beneath the junction of the Paucartambo, the Maranon is joined by a river, about two Britifh miles, or half a Spanifh league in breadth, of fuch force that the courfe of the Maranon is changed for a certain diftance, and bent towards the chain of the Andes. This river, however, wide and powerful as it is, is only a branch of the grand river Beni, already mentioned. Indeed it has been queried whether the Beni or the Apurimac be the principal ftream forming the Maranon. The fource of the Beni, near Sicafica, is about 2° 30′ farther to the fouth than that of the Apurimac; but as its courfe is far more direct, the actual length of the navigation bears no comparifon with that of the Maranon, which at this junction acquires the name of the Grand Para or Pare. The navigation of the Beni might conduct the adventurer to the mines of Potofi, and that of the Apurimac to Cuzco and Lima. At 8° 26′, the Pachitea joins the Maranon. The Pachitea is efteemed the moft beautiful of all thefe tributary ftreams: it rifes in 10° 46′, firft running eaft, then north, and in the early part of its progrefs is called the Pozuzu, efpecially at its confluence with the Mayro, where it forms a noted haven, whence there is an open navigation to the Maranon. The next remarkable ftream that joins the Pachitea is the Piachiz. The courfe of the Maranon here varies from due north to north-eaft; fo that the map of La Cruz muft be erroneous in the great wefterly inflection of its courfe, thereby approaching the Gualaga too nearly by one-half. The Aguaytra alfo joins the Maranon from the weft, at 7° 35′; the Manoa or Cuxniabatay, at 7°; the Saraiacu, at 6° 45′; the Tapichi or Canopocati, oppofite to San Regis, at 5°, which laft river feems alfo to communicate with the Tunguragua. This Tunguragua, Lauricocha, or Jefuitic Maranon, falls into the Maranon at 4° 55′, where the latter is divided into three branches, the chief of which is not lefs than 55 fathoms in depth. The courfe of the Maranon now turns to the eaft. The true Maranon, or Ucaial, as it is alfo called in part of its courfe, is the moft important of all the ftreams which defcend from the grand chain of the Andes. In 1794 it was explored by Father Girval, who navigated it from its junction with the falfe Maranon to its confluence with the Pachitea, and found it of a ferene current, and abounding with fifh, while animals of chace fwarm on the fhores. The favage tribes on this fuperb river are generally pacific, and feem to fpeak dialects of the fame language. From its junction with the river Beni to that with the falfe Maranon it is navigable for large veffels more than 400 leagues; and in the courfe of 300 leagues prefents 132 iflands. The true Maranon, or Ucaial, is navigable at all feafons. The firft Portuguefe ftation that occurs is Sapatinga, and the next San Pablo. Loreto, a Spanifh fortrefs, ftands at the diftance of 12 leagues from Sapatinga; from which latter Pevas, a Spanifh village, is 74 leagues, Napo 104, Iquitos 132, Omaquas 154, the junction of the Ucaial 164, the village of San Regis 184, that of Urarinas 224, and the mouth of the Gualaga 234. See GUALAGA.

The banks of this large river are generally crowned with vaft forefts of lofty trees, among which are many of a rare and medicinal nature. Serpents of prodigious fize are found in the marfhes, and alligators are alfo common. It feems certain, from the difquifition of Condamine, that fome female warriors ftill exift toward the north of this great river. Near its mouth the Bore rifes from 12 to 15 feet in height; and the noife of this irruption is heard at the diftance of two leagues. This effect, called "pororoca," is chiefly obfervable towards the cape del Norte, on the mouth of the Arowary. See BORE.

The fucceffive voyages of Father Girval are rendered interefting, not merely by his having explored the Ucaial or genuine Maranon, but by the account he has given of the different tribes of Indians who inhabit the adjacent territory. Embarking on the lake of the great Cocama, he proceeded to Omaguas, at the confluence of the Maranon and Tunguragua, commonly called St. Joachin, as diftinguifhed from St. Pablo, or St. Paul de Omaguas, one of the firft Portuguefe fettlements at the linear diftance of about 3°, or 180 geographical miles to the E. Having two canoes with 14 Omaguan Indians, robuft and dextrous rowers, he foon paffed from the Tunguragua into the Maranon, which he afcended with refolute and laudable perfeverance, though he fometimes met with little fleets of canoes filled with Indians of unknown tribes, whom he foothed and efcaped by his prudence. The "Conibos" will employ a whole year to hollow out a canoe from one tree, 16 or 20 yards in length, and from five to feven quarters broad, which they accomplifh by means of fharp ftones and fire. The poop is fquare, and the prow drawn to a pyramidal point. Among their flaves were fome of the Mayoruna tribe, who dwell towards the fources of the river Tapichi, and are called Barbudos, becaufe their beards are as ftrong and abundant as thofe of the Spaniards; but they are believed to be defcended from Spanifh foldiers, fcattered in thefe forefts in confequence of a former expedition. After 14 days of navigation, there appeared on the W. a chain of mountains, running S.E. and N.W. Two days after they arrived at the little fettlement of Saraiacu, among the "Panos," and foon after reached the habitation of Anna Rofa, an Italian lady, educated at Lima, who greatly lamented the tragical death of the miffionaries in 1767, committed by the "Chipeos," who had been feverely chaftifed by her nation. Continuing the afcent he reached the river Manoa, alfo called by the Indi-

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ans Judiabalay, on account of the rapidity of the ftream, which neverthelefs he afcended with a view of difcovering a nearer paffage from the Gualaga to the Maranon than the circuit by the Tunguragua. The paffage by land was found difficult, on account of thick woods and precipices; and difcovering a large river, which was the winding Manoa, our traveller defcended the Maranon, and arrived at the miffions of the Maynas, and foon after at Cumbaza, after an abfence of four months. This firft voyage feemed to obliterate the idea, which he had entertained, of the cruelty of the nations on the Maranon. The Indians in general were found to be tall and robuft, and the "Conibos" could vie with the Europeans in fairnefs, if they did not difcolour themfelves, and fuffer moreover from the ftings of the mofquitoes. They bind their children with bandages of flax, that they may grow ftraight: the forehead is alfo flattened in infancy, by boards faftened before and behind, as in their opinion a wife head fhould refemble a full moon: but by this practice, it is faid, they are almoft utterly deprived of memory. The girls are wholly naked, while the married women wear a flight cincture; but among many other tribes complete nakednefs is univerfal. They are painted and tattooed; they do not marry within certain degrees; and the caziques alone ufe polygamy; but the men and women are free to quit each other. They feem to believe in one god, of a human form, who retired to heaven after making the earth; but they do not venture to offer their humble adorations except during earthquakes, which they believe to proceed from the footfteps of their god who vifits the earth, in order to judge by their voices how many men exift. Hence, on occafion of the flighteft earthquake they run from their hovels, caper, and ftamp on the ground, crying out, "here we are, here we are." They alfo believe in an evil fpirit, of whom the moft fagacious, for the fake of emolument, have declared themfelves the priefts, and regulate in his name amours, intrigues, health and ficknefs, and the little campaigns of war. They have alfo many charms and amulets; and yet their fkill in medical herbs is far from being contemptible. They alfo believe in another life, but imagine that thunders are the battles of that diftant world, and that the milky way is a fine foreft for their diverfion. Some believe in tranfmigration, and fuppofe that the fouls of their chiefs and nobles animate tigers and monkies. The dead are difinterred after a certain period, and the bones wafhed and preferved, but fome tribes eat the flefh, that nothing may be loft. Befides the chace and fifhing, they cultivate a few herbs, particularly the "yuca," with which they make the "mazato," their only drink and confolation. The water is generally bad, owing to the heat and the numerous marfhes which taint the rivers. In the cultivation of the "yuca," they cut down the trees with axes of ftone; but they have alfo axes of copper, the firft metal ufed by favages, being often found native and eafily beaten into form, while iron is obdurate and requires the fkill of a more advanced fociety. The ground is flightly moved with a wooden fpade, and the "yuca" being interred the labour is finifhed. They alfo gather cotton, which ferves for their little cinctures. Their darts and arrows are often tinctured with active poifon, drawn from noxious plants. Their confidence in its power is fuch, that they will excite the fury and await the attack of the ftrongeft and fierceft jaguar. They laugh when he prepares to fpring: the arrow flies, and he is dead. But they never employ poifoned weapons in their conflicts, not fo much from liberality of fentiment, as from the fear of a retort. Large fifh are killed with arrows aimed at their heads; the fmall are taken in fnares, or with hooks of bone. From the age of five years boys and girls manage the canoes. Their ruling paffion is war, and it is the bufinefs of the whole tribe, prefided by the cazique or intended general. The tobacco tubes are lighted; the jars of "mazato" pafs round; and as foon as drunkennefs begins, this important fubject becomes the matter of deliberation: the firft and moft folemn queftion being, "with what nation fhall we go to war?" And the next is, "what fhall be the caufe of quarrel?" The caufes are generally fome petty robbery or offence; and the weakeft tribe is generally felected as the moft convenient enemy. When the expedition is refolved upon, the "moans," or priefts of the evil fpirit, take charge of their chiefs, and treat them with fuch abftinence and artificial horrors, that at the end of fome days they come forth rather dead than alive. Thefe favages impute all fuccefs in war to the evil fpirit, and carefully conceal from their deity their proceedings on fuch an occafion. Hence the "moans" are held refponfible for the refult of the expedition; and if it be adverfe they receive a thoufand maledictions, and are beaten almoft to death, becaufe their prayers to the evil fpirit had not been acceptable. As their petty warfares are inceffant, their villages, or large houfe, are prepared for defence; being conftructed in the form of a crefcent, with the convex part towards the wood, and with one door towards fome hill and another to a plain. When the enemy attack at one door a party oppofes; while the others turn the wings of the houfe, and attack the foe on the plains.

Father Girval, in his fecond voyage 1791, entered the mouth of the Ucaial, or true Maranon, and though unaccompanied by any foldier, or white perfon, he was received by the favages with great cordiality, though he was afraid of encountering the "Cafibos" on the eaftern fhore, who are reputed the moft ferocious tribe in thofe regions. But the chief navigators of this part of the Maranon are the "Conibos," who are more humane; and the found of their rude flutes or cornets is the fignal of peace and hofpitality. Canoes of the "Panos" afterwards appeared: and the Father arrived at Saraiacu with a bark and 60 canoes of friendly favages. The cazica, Anna Rofa, conducted the proceffion to a little convent which fhe had founded, and the Indians obeyed her orders with great punctuality. A tribe called the "Piro" inhabit the borders of Maranon, in the latitude of Torma, being about 20 days navigation from Saraiacu or the Manoa. He found abundance of cinnamon trees, and began to inftruct the natives in its cultivation, hoping that this precious fpice would foon become an effential article of commerce. This fettlement was thought of importance, as it prevented the Portuguefe fhips from purfuing their excurfions on the Maranon; and with the fort on the Mayro, inclofed the "Pampas del Sacramento" on both fides, fo as to render it a decided Spanifh province.

The "Panos" and "Conibos," and even the "Chipeos," who had murdered the firft miffionaries, began, it is faid, to fhew fome difpofition for embracing the faith. Some "Piros" were exported from the vicinity of the Mantaro, and the frontiers of Guanta and Jauja, paffing in their canoes on the Maranon; but the "Cafibos" near the Mayro, and on the banks of the delightful Pachitea, a ferocious race, were fcarcely expected to become amicable; having no intercourfe with any other nation, and never leaving their own country, as they have no utenfils for making canoes. They furprife and kill any ftrangers whom they find within their boundaries; and having cooked them with great care, eat them with correfponding comfort, fo that a traveller rarely returns to publifh any account of foreign parts. Thefe favages form the only obftacles to impede the navigation from Manoa to Mayro; but a few regular troops would eafily extirpate thefe irreclaimable tigers. Of thefe miffionaries it is juſtice to add, that occupied in teaching theſe ſavages the arts of life, and of innocent ſuſtenance, whatever a Proteſtant may think of their religion, he cannot withhold the applauſe due to their fortitude and beneficence. Pinkerton's Geog. vol. iii.

Maranon, *Falſe* or *Jeſuits'*, called by the natives *Tunguragua*, and alſo *Lauricocha*, a river of South America, which riſes from the lake of Lauricocha, about eight miles to the N. of Paſco, and after paſſing the Pongo, becomes navigable till it falls into the Ucaial or true Maranon. We may here ſtate, on the authority of father Girval, the reaſons alleged by thoſe who aſſign the ſupremacy to the Ucaial. In the firſt place, its ſources are far more diſtant than thoſe of the Tunguragua, or pretended Maranon of father Fritz: ſecondly, the Beni, Paucartambo, and the Apurimac, are navigable up to a latitude where the falſe Maranon has no exiſtence: thirdly, becauſe the Ucaial, far from being inferior in the quantity of water, is on the contrary broader, and forces the falſe Maranon out of its courſe: fourthly, becauſe all the ancient hiſtorians of the kingdom have acknowledged the Apurimac as the genuine Maranon: fifthly, becauſe, till the year 1687, the very name of Ucaial was unknown, that river being called Apoparu, *i. e.* the great Paro, which is the name alſo given by the natives to the Maranon, or the river of Amazons, after it is joined by the pretended Ucaial. In the year above-mentioned, a law-ſuit aroſe between the Franciſcans of Lima and the Jeſuits of Quito, for the village and miſſions of San Miguel de los Conibos. The Royal Audience demanded maps in order to determine with greater certainty; upon which father Fritz drew the map, which was afterwards engraved at Quito in 1707, and in which the Tunguragua is ſtyled the Maranon, and the Paro is ridiculouſly called "Ucayali," a word, which merely ſignifies a *confluence*, and ſpecially applied by the tribe of the Maynas to that of the Paro and Tunguragua; whence originated the error of father Fritz; while father Acuna aſſerted, with equal boldneſs, that the Napo was the Maranon! The great credit of the Jeſuits led people blindly to follow the nomenclature of father Fritz. Upon the whole it is ſufficiently manifeſt, that the great river Maranon is that denominated the Ucaial by a mere manœuvre of the Jeſuits, in oppoſition to the moſt palpable facts and the ancient hiſtory, traditions, and preſent accounts of the natives; and that the river Ucaial or Apurimac ought to retain to its very ſource the real and juſt appellation of the Maranon: while to the falſe Maranon, in fact a tributary ſtream, and recent appellation confeſſedly erroneous, whether ariſing from artifice or miſtake, the ancient name of Tunguragua ought to be reſtored. This new Maranon, Tunguragua, or Lauricocha, was navigated by Condamine from near the town of Jaen, where it begins to be navigable; thence paſſing N. E. it arrives at the exterior ridge of the Andes, which it cleaves at a paſs called the Pongo, a word which in the Peruvian language ſignifies a gate. This ſublime ſcene diſplays the Lauricocha confined between two parallel walls of an almoſt perpendicular rock. From a breadth of 250 fathoms the river is here contracted to 25; but the rapidity is not extreme, and a raft paſſes the two leagues in about an hour. Pinkerton's Geog. vol. iii.

MARANS, a town of France, in the department of the Lower Charente, and chief place of a canton, in the diſtrict of Rochelle; ſituated in the midſt of ſalt marſhes, on the Sevre, about ſix miles from its mouth. The trade of the inhabitants is conſiderable in ſalt, malt, corn, and meal; 12 miles N.N.W. of La Rochelle. N. lat. 46° 18'. E. long. 0° 54'.

MARANT, or Amarant, a town of Perſia, in the province of Adirbeitzan, containing 2500 houſes, each of which has a garden, ſituated near a river, and watered by canals. Cochineal is found in the neighbourhood. Tradition reports, that Noah was buried here; 50 miles N. of Tabris

MARANTA, in *Botany*, was ſo named by Plumier, in commemoration of Bartholomew Maranta, a native of Venuſia, who died in 1554. He was one of the chief Italian botaniſts of his time, and examined the native plants of his country, while he cultivated exotics in his garden, and commented on Dioſcorides with great diligence and ſagacity. He wrote alſo on the Theriaca and Mithridate, in Italian. Plum. Nov. Gen. 16. t. 36. Linn. Gen. 3 Schreb. 4. Willd. Sp. Pl. v. 1. 13. Mart. Mill. Dict. v. 3. Roſcoe Tr. of Linn. Soc. v. 8. 339. t. 20. f. 2. Ait. Hort. Kew. ed. 2. v. 1. 2. Juſſ. 63. Lamarck Illuſtr. t. 1.—Claſs and order, *Monandria Monogynia*. Nat. Ord. *Scitamineæ*, Linn. *Cannæ*, Juſſ.

Gen. Ch. *Cal.* Perianth ſuperior, of three ſmall, equal, lanceolate, permanent leaves. *Cor.* of one petal, irregular. Tube longer than the calyx, compreſſed, oblique, inflexed. Limb double, unequal, the three outermoſt ſegments ſmalleſt, equal, alternate, oblong, one of them inferior, two ſuperior; innermoſt in two roundiſh lobes, very large, deflexed, conſtituting the lip, ſometimes undivided. *Stam.* Filament one, oppoſite to the lip, dilated, reſembling a ſegment of the corolla; another linear, attached to one edge of the filament, of two cells. *Piſt.* Germen inferior, roundiſh; ſtyle dilated, petal-like, the length of the ſtamen, to which it is united below; ſtigma obſoletely triangular, inflexed. *Peric.* Drupa roundiſh, ſomewhat triangular, dry and leathery, of one cell. *Seed.* Nut ſolitary, oblong, rugoſe, hard, of three cells, two of which are generally abortive.

Eſſ. Ch. Calyx of three leaves. Corolla of one petal, in five ſegments. Anther ſimple, on the edge of the filament. Style petal-like. Stigma ſomewhat triangular. Nut ſolitary, of three cells.

Obſ. This genus belongs to that ſection of the Linnæan *Scitamineæ*, which is characterized by a ſimple anther of two cells, not a double one whoſe cells are diſtant from each other and embrace the thread-ſhaped ſtyle. The term *Cannæ* is reſtricted by Mr. Roſcoe and Mr. Brown to the ſection in queſtion. Juſſieu extends it to the whole of the *Scitamineæ*.

1. M. *arundinacea*. Indian Arrow-root. Linn. Sp. Pl. 2. Redout. Liliac. t. 57. Willd. n. 1. (M. arundinacea, cannacori folio; Mart. Cent. 39. t. 39. Canna indica, radice albâ alexipharmacâ; Sloane Jam. v. 1. 253. t. 149. f. 2.)—Stem branched, herbaceous, annual. Leaves ovato-lanceolate, ſomewhat hairy. Flowers panicled. Fruit nearly globoſe.—Native of South America, and perhaps of ſome of the Weſt India iſlands. It is now cultivated in many of them, the juice of the root being reputed a remedy for wounds inflicted with poiſoned arrows, as well as againſt the ſtings of venomous inſects. If the powder ſold in the ſhops of London be really prepared from this root, which we have no reaſon to diſbelieve, its mucilaginous quality may readily account for the above-mentioned virtues. The potatoe might prove efficacious in the ſame way. This *Maranta* is ſaid to have been ſent to England, either by means of ſeeds or roots, by Houſtoun, before the year 1732. It is cultivated in the ſtove, flowering in July and Auguſt, but is not ornamental enough to be very popular. The *root* is perennial, ſomewhat creeping, knotty or tuberous, with many long white fibres. *Stems* ſeveral, erect, herbaceous, a yard

yard high, branched, ſlender, finely hairy, leafy, rather knotty at the joints, dying down to the root every year. *Leaves* alternate, ſolitary at each joint, with long, ſheathing, ribbed, ſomewhat hairy footſtalks; ovate at their baſe; lanceolate or tapering towards the end; entire, with one rib and numerous tranſverſe parallel veins; paler and ſomewhat hairy beneath; each about four inches long. When dry they are involute, marked, on the upper ſide, with fine ſtreaks parallel to the veins, and on the under, with equally fine tranſverſe corrugations, contrary thereto. *Panicles* terminal, long, lax, and ſpreading, their ſtalks ſlender, tumid and hairy at the baſe, furniſhed at every ramification with a ſolitary, long, linear, narrow, ribbed, at firſt ſheathing, *bractea*. Germen ſomewhat hairy. *Calyx* green, ſmooth. *Corolla* white; its tube about half as long again as the calyx; lip above half the length of the tube, its ſegments ſeparate to the baſe, obovate, ſlightly emarginate. *Fruit* nearly globular and equal, with three obſolete angles, the ſize of a ſmall currant, the ſurface corrugated when dry.

2. M. *gibba*. Gibbous-fruited Arrow-root.—Stem branched, ſhrubby, perennial. Leaves ovate, taper-pointed, ſmooth. Flowers panicled. Germen ſilky. Fruit gibbous at one ſide.—Native of Barbadoes, from whence it was ſent by the earl of Seaforth, when governor of that iſland, to the botanic garden at Liverpool. The curator, Mr. Shepherd, favoured us with a freſh ſpecimen, flowering in November, 1808. The latter obſerves, that the *ſtem* does not die down in winter. In general appearance this much reſembles the foregoing, but the *leaves* are quite ſmooth, except the knot which combines them with their footſtalks, which is, as in the former, very hairy upwards. The *flowers* are ſmaller; their *germen* beautifully ſilky, with denſe ſilvery hairs, though the *ſtalk* below, and *calyx* above, are perfectly ſmooth and naked. All the *fruits* we have ſeen, five in number, were ſo gibbous at one ſide as to be ſemi-globoſe. They loſe their pubeſcence in ripening. A plant was raiſed from the ſeed of this ſpecies, ripened at Liverpool.

3. M. *ſylvatica*. Wood Arrow-root. Roſcoe Tr. of Linn. Soc. v. 8. 340.—Stem much branched, ſhrubby, perennial. Leaves ovate, acute, ſmooth, with a hairy central line above. Flowers panicled. Germen hairy upward.—This was likewiſe ſent from Barbadoes to the Liverpool garden, by lord Seaforth. It flowers leſs freely than the laſt, and had not in 1808 ſhewn any ſign of forming ſeed. The *ſtem* is hard and knotty, ſomewhat in the ſtyle of a bamboo. *Leaves* numerous, about two inches long, ovate, ſcarcely taper-pointed, ſmooth, except a conſtant hairy line, cloſe to each ſide of the nerve, above. They are ſtriated above and below, in this and the laſt, exactly as in M. *arundinacea*. The knot between the leaf and the footſtalk is thick, ſhort, hairy upwards. *Flowers* few and ſmall. *Calyx-leaves* broader, and not half ſo long as in either of thoſe before mentioned, being quite elliptical. *Corolla* not twice the length of the calyx. *Germen* clothed, in its upper part only, with a few long white hairs, which appear ſoon to fall off.

4. M. *Tonchat*. Eaſt Indian Arrow-root. Willd. n. 2. (Donax Arundaſtrum; Loureir. Cochinch. 11. Arundaſtrum, vel Tonchat ſeytam; Rumph. Amboin. v. 4. 22. t. 7.)—Stem branched, ſhrubby, perennial. Leaves elliptic-ovate, pointed, ſmooth. Flowers panicled. Germen ſilky. Fruit globoſe. Corolla five times the length of the calyx.—Native of woods, plains, and vallies in the Eaſt Indies, from whence it was brought us by lord viſcount Valentia. Rumphius ſays it is more plentiful in Ceram and Celebes, than in Amboyna. Loureiro gathered it in the woods of Cochinchina. (See DONAX.) The *ſtem* is eight feet high, ſhrubby, hard, round, ſmooth, and ſolid; ſimple and naked in the lower part; branched and leafy above. *Leaves* broad-ovate, with a ſmall point, ſcarcely three inches long in our dried ſpecimen; Rumphius deſcribes them as a ſpan in length, and the breadth of five or ſix fingers. They are ſmooth, with many lateral veins, but not ſtriated lengthwiſe or tranſverſely as in the three foregoing. The knot at their baſe is cylindrical but ſhort, ſomewhat hairy, ſometimes curved. *Panicle* erect when in flower, drooping in fruit. *Bracteas* large and long. *Flowers* white, conſiderably larger than any of the former. *Calyx-leaves* tapering from a broad baſe to the point, ſtrongly ribbed, a quarter of an inch long. Tube of the *corolla* ſcarcely exceeding the calyx; ſegments of the outer limb above an inch long, linear; lip ſtill longer, ſtalked, with broad dilated rounded lobes, whoſe number and poſition we cannot, from the dried ſpecimen, aſcertain. The *germen* is ſhort and broad, very denſely clothed with white ſilky down. *Fruit*, according to Rumphius and Loureiro, nearly globoſe, exactly agreeing with our generic deſcription. This ſpecies is, as Ventenat has obſerved under M. *arundinacea*, very different from M. *Tonchat* of Aublet, which may be merely a variety of the firſt ſpecies; but this we have no means of determining.

5. M. *lutea*. Yellowiſh Arrow-root. Jacq. Collect. v. 4. 117. Ic. Rar. t. 201. Roſcoe Tr. of Linn. Soc. v. 8. 339.—Stem branched, ſhrubby, perennial. Leaves ovate. Branches of the panicle ſomewhat ſpiked. Bracteas ovate, imbricated, coloured.—Native of moiſt woods in the Caraccas. It flowered with Jacquin, in the ſtove, from June to Auguſt, ripening fruit in September and October. It has the tuberous creeping *root*, and general habit, of the four foregoing ſpecies. The *ſtems* are ſeveral, ſix feet high, perennial, branched, ſmooth, and ſhining. *Leaves* ſeveral, in two ranks from the root; thoſe of the ſtem alternate, ovate, about a foot long and four inches wide; their *footſtalks* about the ſame length. *Panicle* erect, of a few alternate zigzag branches. *Bracteas* two-ranked, imbricated, ovate, folded, about an inch long, each enfolding a two-flowered partial ſtalk, with a much ſmaller internal bractea. *Calyx-leaves* elliptical, of the ſame dirty or tawny-yellow as the bracteas. *Corolla* white; the lip three-lobed. *Germen* ſmooth. Coat of the *fruit* firmly adhering to the nut. Our account is taken from Jacquin's works, but a ſpecimen brought, we believe, from the Braſils, by the late ſir G. L. Staunton, agrees with it, as far as we can examine.

6. M. *gracilis*. Slender-ſpiked Arrow-root. Rudge Guian. 8. t. 3.—Stems ſimple. Leaves ovate, pointed. Spikes terminal, ſolitary. Bracteas imbricated, ſheathing, cylindrical.—Native of Guiana, communicated by T. F. Forſter, eſq. This has the habit of a bamboo, except that the ſtems are ſimple, and only a foot high. They are ſlender, ſmooth, and leafy. *Leaves* near three inches long, light green, taper-pointed, rounded at the baſe, ſmooth, except a hairy line along the nerve on the upper ſide; their veins tranſverſe, as in the other ſpecies, not parallel to the rib, as in the above plate; the knot at their baſe very ſlender, hairy on its upper ſide; ſheath ribbed, ſmooth, dilated upwards. *Spikes* ſolitary at the tops of the ſtems, about four inches long, ſtraight, erect, ſlender, cylindrical, acute, being cloſely enveloped in five, ſix, or more, cylindrical, imbricated *bracteas*, about an inch long, from each of which, in ſucceſſion, ſpring a couple of *flowers*, whoſe tube is very long, incloſed in the bractea; the outſide of their *calyx* hairy; their *lip*, as far as we can diſcern, undivided.

7.* M. *obliqua.* Oblique-leaved Arrow-root. Rudge Guian. 8. t. 2.—Leaves elliptical, oblique at the point, on very long footftalks. Spikes cluftered. Bracteas crowded, fheathing, cylindrical.—Found by Mr. Alexander Anderfon in the Weft Indies, according to the Bankfian herbarium. Mr. Rudge had it from Guiana. Of the form of the whole plant we are uncertain, but by our fpecimen it appears herbaceous, the *leaves* being radical, on *footftalks* two feet long, fheathing in their lower part, and crowned with a cylindrical, fcarcely fwelling knot, above an inch in length. The *leaf* itfelf is about a foot long, and fix inches broad, elliptical or fomewhat ovate, terminating in a very fhort, oblique or lateral, curved point; fmooth on both fides; the veins tranfverfe, extremely numerous and clofe, five times as numerous as in Mr. Rudge's figure. *Spikes* apparently terminal, three together, either accompanied by a fheathing-ftalked leaf, as in the figure juft mentioned, or by one common *bractea* larger than the reft, as in our fpecimen. Each *fpike* is about a foot long, almoft perfectly fimple, flightly zigzag, flender, cylindrical, acute, clofely enveloped in numerous, alternate, cylindrical, crowded, but fcarcely imbricated, hard, downy *bracteas*, above an inch long, each containing two *flowers*. About half a dozen lanceolate cartilaginous bodies are feen projecting juft beyond the point of each *bractea*, looking like the anthers of a grafs. Thefe appear to us the tips of a number of linear, membranous, internal *bracteas*, about three of which furround each flower, and which might be taken for the *calyx*, were they not inferted below the *germen*. There are alfo two or three broad membranous *bracteas*, external with refpect to thefe, but inclofed within the common fheathing one. Of the real *calyx* or *corolla* our fpecimen gives no opportunity of judging. The *germen* appears to be turbinate, crowned with denfe upright hairs. *Style* compreffed, the length of the bracteas, with the proper inflexed ftigma of the genus. Mr. Rudge reprefents the *corolla* as about twice the length of the external *bractea*, with a long flender tube, and a ftructure analogous to the preceding fpecies. The *lip*, it feems, is undivided.

8. M. *fpicata.* Long-ftalked Spiked Arrow-root. Aubl. Guian. 4.—Leaves ovate-oblong, unequal-fided, oblique at the point, on long footftalks. Spike fimple, folitary, on a long ftalk.—Gathered by Aublet in a boggy foreft in Guiana. One of his leaves was given by fir Jofeph Banks to the younger Linnæus, who has, in his herbarium, accompanied it with a rough drawing of the fpike of flowers, and a note in Swedifh, faying he had "feen four leaves, all of the fame ftrange fhape." Thefe materials, though imperfect, are valuable, as Aublet has given no figure of this, any more than of his M. *Arouma*, *humilis*, or *lutea*, about which therefore following botanifts have been much in the dark. Our *leaf* of M. *fpicata* is a foot long and three inches broad, fmooth and fhining, with numerous principal, as well as intermediate, tranfverfe veins; the bafe is rather unequal, and the two halves of the leaf upwards much more fo, one margin being curved, the other ftraight; the midrib running up perfectly ftraight till it reaches the former margin, when it turns fuddenly into the very fhort lateral or oblique point. The *footftalk* is, perhaps, as long as the leaf; bordered or fheathing below; crowned with a cylindrical finely downy knot, an inch long, where it joins the leaf. *Spike* erect, three inches in length, fupported by a very long, round, fimple, erect, naked *ftalk* (which we may prefume to be radical), and fubtended by a large ovate fheathing *bractea*. Each *flower*, or perhaps pair of *flowers*, appears alfo to have an appropriate much narrower *bractea*, an inch long, and thefe *bracteas* are about ten in all, imbricated in feveral rows. Aublet fays they are firm and coriaceous, and the *flowers* white.

9. M? *Allouia.* Lateral-tufted Arrow-root. Aubl. Guian. 3. (Naru kila; Rheede Malab. v. 11. 67. t. 34.)—Leaves radical, ovate, acute, on long ftalks. Head of flowers feffile, from a lateral cleft in the footftalk. We venture to adopt this fpecies from Aublet, becaufe the figure he cites in the *Hortus Malabaricus* gives an idea of what he intends. He found his plant in the fame marfhy foreft with the laft. The *root* is furnifhed with knobs of various fizes, good to eat when roafted. *Leaves* radical, large, on long *footftalks*, fome of which bear a lateral tuft of numerous white feffile *flowers*; a mode of flowering analogous to that of the *Acorus*. The genus however of this fpecies muft depend on Aublet's authority. His three others above-mentioned, fee n. 8, we muft leave in the uncertainty in which we find them.

10. M? *comofa.* Leafy-headed Arrow-root. Linn. Suppl. 80. Willd. n. 4. Rofcoe Tr. of Linn. Soc. v. 8. 340. (Curcuma nova; Amoen. Acad. v. 8. 251.)—Leaves radical, elliptical, on long ftalks. Flowers in a terminal tuft, crowned with leafy *bracteas*.—Sent by Dalberg from Surinam. The *leaves* have the habit of the laft. Both fpecies feem to want the knot at the top of their *footftalks*, which is a ftrong prefumption of their being no true *Marantæ*. Indeed Linnæus himfelf expreffes his doubts of the prefent plant. The *flower-ftalk* is radical, three feet high, round, fimple, fmooth and naked, except at the top, where it bears a fine crown of elliptic-lanceolate leafy *bracteas*, like that of an *Eucomis*, under which the *flowers* are ftationed, in feffile drooping tufts. We find their habit and ftructure very unlike what are proper to this genus, and the *ftamen* is more like that of an *Alpinia*, to which we fhould, at a venture, remove this plant, without much fcruple.

We omit M. *malaccenfis*, Willd. n. 3, adopted by that author from Burmann (Galanga malaccenfis; Rumph. Amb. v. 5. 176. t. 71. f. 1.), as the figure of Rumphius fhews it to be, in habit and character, an *Alpinia*, to which genus Mr. Rofcoe has referred it in Tr. of Linn. Soc. v. 8. 345. S.

Maranta, in *Gardening*, contains plants of the herbaceous, perennial, exotic kind, of which the fpecies cultivated is the Indian arrow-root (M. arundinacea).

The root of this plant, when wafhed, pounded fine, and bleached, makes a fine nutritive powder, which is made ufe of as food in many cafes where the ftomach is weak and incapable of digefting more folid kinds.

Method of Culture.—All the plants of this fpecies may be increafed by dividing the roots and planting them in pots of light rich earth, in the fpring, juft before they begin to fhoot, plunging them in the bark hot-bed of the ftove, where they muft be kept in general, being frequently refrefhed with water, when in a ftate of growth, having free air, after they become of fome ftrength, admitted to them.

Ornament and variety are afforded by them in ftove collections among other tender plants.

MARANTABUAN, in *Geography*, a fmall ifland in the Eaft India fea, N. of Borneo. N. lat. 6° 55′. E. long. 117° 29′.

MARASA, a town of Africa, in the kingdom of Wangara, on the Niger. N. lat. 16°. E. long. 17°.

MARASCA, a town of Italy, in the department of the Upper Po; three miles W. of Cremona.

MARASCH, or Merasch, a town of Afiatic Turkey, and capital of a Sangiacate, under the pacha of Caramania,

nia, and the fee of a Jacobite bifhop; 140 miles W.S.W. of Diarbekir. N. lat. 37° 24′. E. long. 36° 35′.

MARASIND Islands, two fmall iflands in the Eaft India fea. S. lat. 5° 15′.

MARASKER, a fmall ifland on the E. fide of the gulf of Bothnia. N. lat. 63° 21′. E. long. 21° 25′.

MARASMUS, in *Medicine*, from μαραινω, *to wafte*, is a term applicable to every chronic difeafe, in which great emaciation of the folids take place. A marafmus is faid to be prefent in the laft ftage of every fpecies of confumption or decline; but the term is more efpecially ufed to denote the *mefenteric* confumption, or that fpecies of decline which occurs in children, and originates in derangement of the abdominal vifcera. This difeafe will be found defcribed at length under the article Infants, *Difeafes of*, § 4.

MARASNA, in *Geography*, a town of Africa, in Wangara. N. lat. 14° 52′. E. long. 16° 12′.

MARAT, John Paul, in *Biography*, a native of Switzerland, who became a prominent actor in the French revolution, was born in 1744: he went to Paris to ftudy phyfic, and, probably, not having patience to purfue the profeffion in a regular courfe, he became an empyric, felling his medicines at an extravagant price. On the breaking out of the revolution, he took the lead among the moft violent and favage of all the factions that difgraced the capital. He publifhed a periodical paper, entitled the "Publicifte Parifien," in which he, without fcruple, and without any regard to decency and truth, attacked the virtuous Neckar, and other men eminent for their integrity and public talents. This journal did not laft long, but the author had other projects in view, and he next fet on foot a paper, entitled "The Friend of the People," in which he unblufhingly exhorted the people to revolt, pillage, and murder. He excited the troops to ufe their arms againft their generals, the poor to plunder the rich, and the people at large to rife againft the king. After the depofition of Lewis XVI he was named a deputy of the department of Paris, to the convention, in which affembly he appeared armed with piftols. In April, 1793, he publicly denounced the leaders of the Briffotine party, accufing them of treafon againft the ftate; he was fupported by Robefpierre, a violent tumult enfued, but Marat and his friends were fubdued, and himfelf impeached and profecuted; in a few days being brought to trial he was acquitted. The triumph of his party was now unbounded, and they foon gained fuch an afcendancy over their enemies, that they murdered or banifhed all that attempted to obftruct the progrefs of their nefarious projects; till at length their leader Marat fell a victim to the enthufiaftic rage of a female, Charlotte Corde, who had travelled from Caen, in Normandy, with a determination of refcuing, as fhe hoped, her country from the hands of barbarians, by the affaffination of one of the chief among them. He died unpitied by every human being who was not of the atrocious faction which he led, having, for fome weeks, acted the moft favage parts, and been the means of involving many of the moft virtuous characters in France in almoft indifcriminate flaughter. Previoufly to joining in revolutionary politics, he was known as an author, and publifhed a work "On Man, or Principles of the reciprocal Influence of the Soul and Body," in two volumes, 12mo: alfo, fome tracts on Electricity and Light, in which he attacked the Newtonian Syftem. New Ann Reg 1793.

MARATE, in *Geography*, a low defert ifland in the Eaft India fea, about eight miles from the coaft of Africa, four miles in circumference. On the S. coaft is a good haven, fecure from all winds, formed by two points of land, inclofing a fpacious harbour, narrow at the mouth, where lies a very long flat ifland with fome fand-banks: the depth is three fathoms in the fhalloweft place. N. lat. 18° 35′.

MARATHON, in *Ancient Geography*, a fmall city of Attica, near the fea, about 40 miles from Athens, famous for the victory of the Athenians over the Perfians. The Perfian army commanded by Datis confifted of 100,000 foot, and 10,000 horfe; that of the Athenians amounted in all but to 10,000 men. This latter had 10 generals, of whom Miltiades was the chief; and thefe 10 were to have the command of the whole army, each for a day, one after another. It was a fubject of great difpute among thefe officers, whether they fhould hazard a battle, or expect the enemy within their walls. The latter opinion was that of a great majority; Miltiades and Ariftides were for rifking an immediate engagement, and this meafure was adopted. Ariftides, well knowing that a command which changed every day muft neceffarily be feeble and fluctuating, judged it prudent to veft the whole power in a fingle perfon, and in order to induce his colleagues to adopt this plan, he himfelf fet the firft example of refignation. When his day of command occurred, he refigned it to Miltiades, as the more able and experienced general. The other commanders followed his example; fo that Miltiades had the fole command. When the day of battle arrived, he endeavoured, by the advantage of the ground, to gain what he wanted in ftrength and number. Accordingly he drew up his army at the foot of a mountain, that the oppofing army might not be able to furround him, or charge him in the rear. On the two fides of his army he caufed large trees to be thrown, in order to cover his flanks, and render the Perfian cavalry ufelefs. As foon as the fignal for battle was given, the Athenians ran againft the enemy with all imaginable fury, which was the firft inftance, fays Herodotus, in which the Grecians thus began an engagement. The battle was fierce and obftinate. Miltiades had made the wings of his army very ftrong, but had left the main body more weak and not fo deep. As he had but 10,000 men to oppofe to a very numerous army, it was impoffible for him to make a large front, or to give an equal depth to his battalions. He therefore concluded that he could fucceed only by the efforts which he fhould make with his two wings, in order to break and difperfe thofe of the Perfians; not doubting that when his wings were victorious, they would be able to attack the enemy's main body in flank, and complete the victory without much difficulty. This was the plan which Hannibal afterwards followed at the battle of Cannæ. The Perfians attacked the main body of the Grecian army, and made their greateft effort upon their front. This was led by Ariftides and Themiftocles, who fupported it for fome time with intrepid bravery, but were at length obliged to give way. At that inftant came up the two victorious wings, and totally routed the Barbarians. The Athenians purfued them to their fhips, fet many of them on fire, and took feven. They had not above 200 men killed on their fide in this engagement; whereas on the fide of the Perfians above 6000 were flain, without reckoning thofe who fell into the fea as they endeavoured to efcape, or thofe that were confumed with the fhips fet on fire. The Perfians had thought themfelves fo fure of victory, that they had brought marble to Marathon, in order to erect a trophy there. The Grecians took this marble and caufed a ftatue to be made of it by Phidias, in honour of the goddefs Nemefis, who had a temple near the place where the battle was fought. The memory of thofe Athenians that were flain in the battle was honoured by illuftrious monuments erected to them in the place where the battle was fought; upon which their own names, and that of their tribes, were recorded. Miltiades's was afterwards erected in the same place. All the honour that was paid to Miltiades, the great deliverer of Athens and of all Greece, was, that in a picture of the battle of Marathon, drawn by order of the Athenians, he was represented at the head of the 10 commanders, exhorting the soldiers, and setting them an example of their duty. This picture was painted gratis by the celebrated Polygnotus, of the isle of Thasos, one of the finest painters of his time, and it was preserved at Athens in a gallery, adorned and enriched with different paintings, excellent in their kind, and done by the greatest masters. The battle of Marathon was fought in the 3d year of the 72d Olympiad, B.C. 490.

In the plain of Marathon, and N.E. of it, was a large lake, which received a river, that ran from the N.W. There was also a mountain of Attica of the same name. Marathon, once so famous, is now an inconsiderable village of European Turkey, in Livadia, consisting only of a few houses, but retaining its ancient name. The spot where the brave Athenians were buried is situated near a lake, from which a river runs into the bay of Negroponte; nine miles N.N.E. of Athens.

MARATHUS, a large and rich town of Phœnicia, situated between Batanea and Carnæa, according to Strabo. This town obtained liberty from one of the successors of Alexander, with the privilege of being governed by its own laws. A war occurring between this city and that of Arad, the inhabitants of the latter place took it, razed it, and divided its territory among themselves.

MARATHUSA, a town in the interior of the isle of Crete.—Also, an island of Asia, upon the coast of Asia Minor, near Ephesus, according to Pliny, but according to Thucydides and Steph. Byz, before Clazomenes.

MARATROCAMPO, in *Geography*, a town of the island of Samos; six miles W. of Cora.

MARATTA, Carlo, in *Biography*, an historical painter, and one of those fortunate men who receive during their lives their full portions of praise and emolument. He was born at Camurano, in the marquisate of Ancona, in the year 1625. He was the disciple and friend of Andrea Sacchi, with whom, to the death of the latter, he pursued his studies, and continued his attachment.

Although he enjoyed during his life, and perhaps deserved, the reputation of the best painter in Europe, yet when compared with the truly great, he never rose above mediocrity. It is very seldom that enlarged and grand conception reigns in his compositions; but a certain suavity and loveliness in his madonnas, which he seems to have acquired from Correggio's works, of grace in his angels, and devout character in his saints, render his pictures always agreeable, and are the source of his renown. From his first performances being chiefly madonnas, his contemporaries treated him with the appellative of Cartuccio delle Madonini, and probably by that very circumstance excited him to employ his talents upon more extended and difficult subjects, in which he exhibited his superior taste and skill. He evidently appears to have studied the works of Raphael, but never felt the beauty of his simplicity, nor understood the principles of his design and composition. For the well understood draperies and judicious introduction of folds which we see in the best pictures of that great master, Maratta resorted to a fulness and overwhelming quantity; arranged in the style of Sacchi; but hiding too much of the figures, and giving them by that means a heaviness, and often a bad proportion. His colouring is in general clean and freely wrought, but sometimes his shadow colour partakes too much of red, which does not unite in a friendly manner with the lighter tones, and destroys the brilliancy of effect which he generally aims at.

There is a great number of his works in the churches and palaces of Rome, which bear testimony of his popularity, and they were sold at prodigious prices during his life. Of late, since a more just taste in art is arisen, they have fallen in the scale to their proper level; but still are, as they deserve to be, held in much estimation.

He lived to the advanced age of 88, and practised his art to a very late period of his existence.

MARATTIA, in *Botany*, was so named by Dr. Swartz, in commemoration of John Francis Maratti, abbot of Vallumbrosa, lecturer on botany, and superintendant of the botanic garden, at Rome. He published three small Latin tracts in that city. First a description of the flowers of dorsiferous ferns, in 1760, which is rather a description of their fruits; for the author certainly has in some cases mistaken the latter for the former; in others delineated as organs of impregnation, what are, at most, very doubtfully such. Yet this essay occasioned Dr. Swartz to choose a genus of ferns to bear his name; and he has certainly fallen on one of the most singular, distinct, and elegant, in nature. Maratti's second work, printed in 1772, is a definition, with figures, of two supposed new genera, entitled *Romulea* and *Saturnia*; the former of which is *Ixia Bulbocodium*, the latter *Allium Chamæmoly*. His last publication, dated 1776, is on the Zoophytes and Lithophytes of the Mediterranean; of which, considered as plants, he treats systematically, in the Linnæan style, with synonyms. All these tracts are of rare occurrence in England. Swartz. Prodr. 128. Fil. 168. Sims and Kon. Ann. v. 2. 309. t. 10. f. 6. Sm. Plant. Ic. 46. Mem. de l'Acad. de Turin, v. 5. 419. Tracts, 259. Sprengel Crypt. 180. Mart. Mill. Dict. v. 3. (Myriotheca; Juss. 15. Lamarck Illustr. t. 866.)—Class and order, *Cryptogamia Filices*; sect. *exannulatæ*. Nat. Ord. *Filices dorsiferæ*.

Eff. Ch. Capsules oval, scattered, bursting longitudinally on their upper side, disclosing a row of cells in each division. Involucrum none.

This very remarkable and beautiful genus ranges next in affinity to Danæa; see that article. It differs however essentially, in the capsules being formed of two lobes, at first cohering longitudinally, by what afterwards becomes their upper surface, and discloses a row of from four to ten cells in each lobe, opening each by a separate orifice, smaller than the internal diameter of the cell, in the said upper surface. The entire capsule therefore is oval, with a determinate number of cells, very different from the indefinite aggregation of single-celled capsules, seen in *Danæa*. Nothing is known of the flower, or mode of impregnation. The capsules stand separately on the veins of the frond, without any involucrum, and in a young state appear like little smooth grains. When mature they are generally the size of half a mustard-seed. Their seeds are inconceivably minute.—Five, or at most six, species are known.

1. M. *alata*. Wing-stalked Marattia. Swartz Prodr. 128. Sm. Plant. Ic. t. 46.—Frond doubly pinnate. Leaflets sharply serrated. General stalk scaly; partial ones winged. Native of Jamaica, where it has been gathered by several botanists. This appears to be an herbaceous *fern*, perhaps three or four feet high, but we have not seen either the *root* or the lower part of the *frond*. The upper part is doubly and oppositely pinnate, with square scaly *stalks*, the whole of which in the branches, and the upper part of the main stalk, is winged with a leafy entire border, contracted at the insertion of every leaflet. The *leaflets* are sessile, an inch long, more or less, very nearly, if not entirely, opposite,

ovate

ovate-oblong, bluntiſh, ſharply and rather deeply ſerrated, eſpecially towards the extremity, veiny, the veins always dividing ſoon after they leave the mid-rib, each branch ending in one of the ſerratures. The upper ſide is ſmooth, with a prominent rib; under ſide paler, minutely ſcaly about the rib and veins. The lower *leaflets* are often lobed or pinnatifid; the upper ones diminiſh gradually, become confluent, and form an elongated ſerrated point to each branch. The truly remarkable *capſules* are three, four, or five on each ſide of the mid-rib of moſt of the leaflets, towards the margin beneath, each ſtationed on a branch of a vein, and about the ſize of a garden-poppy ſeed, externally pale brown. When the lobes ſeparate, their upper ſide appears of a pale ſulphur-colour, ſtriated tranſverſely where the cells are to open, and more or leſs crenate at the edges. At length the whole capſule becomes browner, and the cells open by about five oval-oblong orifices in each lobe.

2. M. *lævis*. Smooth-ſtalked Marattia. Sm. Plant. Ic. t. 47.—Frond doubly or triply pinnate. Stalks ſmooth; the partial ones winged. Leaflets bluntly ſerrated; the uppermoſt confluent.—Gathered by M. Thierry de Menonville in Hiſpaniola, not in Dominica.—This has a general reſemblance to the foregoing, but is partly triply pinnate, and quite deſtitute of ſcales on the ſtalks or veins. The ſerratures of the *leaflets* are blunter; partial ſtalks of the lower ones very broadly winged; and the *capſules* are ſhorter, almoſt globoſe before they open, having but four, rarely five, cells in each lobe. Their margin moreover is quite entire, not crenate or cracked. *Seeds* extremely minute, white. It may alſo be remarked that the principal ſubdiviſions of the *frond* in this ſpecies are more generally alternate, and the veins of the *leaflets* are moſt of them ſimple, not divided.

3. M. *fraxinea*. Aſh-leaved Marattia. Sm. Plant. Ic. t. 48.—Frond doubly pinnate. Stalks ſmooth, ſimple. Leaflets alternate, lanceolate, ſerrated, all diſtinct.—Native of the iſland of Mauritius. Our ſpecimen was given by the celebrated M. Thouin to the younger Linnæus, when at Paris. It is one of the moſt magnificent, as well as curious, of its whole natural order. We have only a branch of the *frond*, which ſhews the whole to be at leaſt doubly pinnate, in an alternate order. This *branch* is above a foot long, and much reſembles the leaf of ſome ſort of aſh, conſiſting of 22 alternate ſeſſile *leaflets*; beſides the terminal one, which is not larger than the others. The *ſtalks* are very ſmooth and naked, ſimple, except a very ſlight wing near the very top. *Leaflets* two or three inches long, on very ſhort ſtalks, ſmooth, bright green, lanceolate or ſlightly ovate, ſcarcely an inch wide in any part; their point elongated; their margin copiouſly, ſharply, and pretty equally ſerrated; their baſe wedge-ſhaped and entire; their tranſverſe veins numerous, parallel, moſtly ſimple, ſometimes forked, quite deſtitute of ſcalineſs. *Capſules* diſpoſed near the margin, not very abundantly or univerſally, rather larger than thoſe of the firſt ſpecies, roundiſh-oval, brown; each lobe quite entire at the edge, and furniſhed with about ſix cells. Dr. Swartz erroneouſly quotes the author of the preſent article, as ſaying the branches (*pinnæ*) are oppoſite.

4. M. *ſorbifolia*. Service-leaved Marattia. "Bory de St. Vincent's Voyage, v. 1. 267." *Swartz*.—"Frond doubly pinnate. Branches alternate. Leaflets linear-lanceolate." *Sw.* Native of the iſle of Bourbon.—We know this merely by what we have here copied from Dr. Swartz, not having acceſs to the book he quotes. The author we follow ſuſpects this to be the very ſpecies figured by Lamarck in his Illuſtrations of Genera, tab. 866; but we ſhould rather ſuppoſe that figure to be taken from *M. fraxinea*, except poſſibly the ſeparate leaflet. The *capſule* and its diſſections are all copied from Sm. Pl. Ic. t. 48.

5. M. *oppoſitifolia*. Oppoſite-leaved Marattia.—Frond .... Leaflets oppoſite, linear-lanceolate, ſharply ſerrated.—Native country unknown. We have a mutilated ſpecimen of this, without any mark whatever, in the herbarium of the younger Linnæus. It conſiſts of near four inches only of the *rachis*, or ſtalk, which is as thick as a gooſe-quill, ſmooth, convex beneath, marked with a narrow furrow above. This appears to be but a very ſmall portion of the branch, or whole frond, we cannot tell which. It bears four pair of oppoſite *leaflets*, all nearly of an equal ſize, not quite four inches long, almoſt an inch wide, linear-lanceolate, taper-pointed, finely, ſharply, and equally ſerrated throughout, except at the baſe, veined like *M. fraxinea*, and ſupported on very ſhort ſtalks. The upper ſurface is ſmooth; the under paler, its veins rough with fine linear ſcales. *Capſules* very numerous on every leaflet, rather larger than thoſe of the *fraxinea*, but otherwiſe like them, and containing the ſame, or occaſionally a greater, number of cells. Theſe *capſules* form a continued line near each margin, except at the baſe and point, being from 40 to 50 in each row. We ſhould, by the name, have ſuppoſed this the *ſorbifolia* laſt mentioned, had the *leaflets* of that been deſcribed as oppoſite. The ſhape and ſize of each *leaflet* well agree with Lamarck's ſeparate one, fig. *b*, but his footſtalk is too long, and capſules not ſufficiently copious or crowded.

6. M. *ſalicina*. Willow-leaved Marattia.—Frond ſimply pinnate? Stalk ſmooth, ſimple. Leaflets alternate, ſtalked, linear, very ſlightly crenate, with ſerrated points.—Our ſpecimen of this nondeſcript fern was communicated by the late Rob. Moleſworth, eſq., as a native of New South Wales. As it was accompanied by a large collection of other plants, undoubtedly the produce of that country, and by no others, we preſume the account muſt be correct; yet there being no *Marattia* mentioned in Mr. Brown's *Prodromus*, cannot but induce ſome ſuſpicion. It is however a moſt curious and diſtinct ſpecies. We cannot poſitively ſay whether our ſpecimen be the whole plant, from the root; in which caſe the *frond* is ſimply pinnate; or a branch rudely torn from a more compound *frond*. The *ſtalk* is two feet long, ſmooth, ſimple and even, ſomewhat quadrangular, very firm and ſtrong. *Leaflets* numerous, (about 40), on ſhort ſtalks, alternate, ſpreading, linear, ſharp-pointed, four or five inches long and half an inch broad; ſmooth and of a fine green above; rather paler, and having capillary ſcales on the lower part of the rib, beneath; the margin is ſo very ſlightly and obtuſely crenate it might almoſt be called entire, but the ſhort taper point, beyond the capſules, is ſerrated; the veins are much like the foregoing. The *capſules* are exceſſively numerous, forming a cloſe row, along each edge of the leaflet, every vein bearing one, ſo that there are near 100 in every row. They are larger than in any other known ſpecies, and have nearly a double number of cells, whoſe orifices are linear, and crowded cloſe together.—When we conſider the poſſible rate of increaſe in ſuch a plant as this by ſeed, it is as ſtupendous as that of the Ling-fiſh, whoſe progeny, if uninterrupted, would, according to the calculation of Linnæus, in 20 years fill the whole ocean. Here are perhaps 8000 capſules, each having about 20 cells, which makes 160,000, and we can hardly conceive the quantity of minute ſeeds in each cell; at leaſt it is impoſſible to count them with any degree of exactneſs. The number of ſeeds however in ſome ferns, is probably much greater.

Not having yet been able to procure the volume of Willdenow's denow's Sp. Pl. which treats of ferns, we know not how far our new ſpecies may accord with any of his. S.

MARATTOUR, in *Geography*, a town of Hindooſtan, in the circar of Guntoor; 28 miles N. of Mootapilly.

MARATUBA, an iſland in the Eaſt Indian ſea, about 24 miles in length from N. to S. Its breadth varies from 12 miles to 4. It is the largeſt of a cluſter, to which it gives name; the next in ſize is Kakkabban; the reſt are very ſmall. N. lat. 2° 14′. E. long 118 30′.

MARAUA, a town of Arabia, in the province of Yemen; 16 miles N.N.E. of Hodeida.

MARAUDING, from the French, *maraude*, in *Military Language*, is a term applied to a party of ſoldiers, who, without any order, go into the neighbouring houſes or villages, when the army is either in camp or garriſon, to plunder and deſtroy, &c.

MARAVEDI, a little Spaniſh copper coin, worth ſomewhat more than a French denier, or half a farthing Engliſh.

The word is Arabic, and took its riſe from the *Almoravides*, a dynaſty of Moors, who, paſſing out of Africa into Spain, impoſed their own name on this coin, which by corruption was afterwards changed into *maravedi*.—Mention is made of it in the decretals, as well as in other Latin writers, under the name of *marabitini*.

The Spaniards alſo count by maravedis, both in commerce and in their finances, though the coin itſelf is no longer current among them. Thirty-four maravedis vellon are equal to the real vellon, which is the moſt general money of account. Madrid, and all Caſtile, with moſt of the adjacent provinces, and alſo Bilboa, Malaga, and Gallicia, keep accounts in reals and maravedis vellon. The real of new plate is double the real vellon, and is alſo reckoned at 34 maravedis of new plate. This real is repreſented by an effective coin of baſe ſilver; but books are not kept in any part of Spain in this money. The real of old plate is alſo reckoned at 34 maravedis of old plate. Cadiz and Seville keep accounts in reals and maravedis of old plate. The real of old plate is worth about 5*d.*; and the real vellon $2\frac{1}{2}$*d.* nearly; or, more accurately, 1*l.* ſterling = 48 reals $20\frac{2}{3}$ maravedis of old plate, or 91 reals 17 maravedis vellon. See REAL and SPAIN.

This ſmallneſs of the coin produces vaſt numbers in the Spaniſh accounts and calculation; inſomuch that a ſtranger or correſpondent would think himſelf indebted ſeveral millions for a commodity that coſt but a few pounds.

In the laws of Spain, we meet with ſeveral kinds of maravedis; Alphonſine maravedis, white maravedis, maravedis of good money, maravedis Combrenos, black maravedis, and old maravedis. When we find maravedis alone, and without any addition, it is to be underſtood of theſe mentioned above. The reſt are different in value, fineneſs of metal, time, &c. Mariana aſſerts, that this coin is older than the Moors; that it came from the Goths; that it was anciently equal to a third part of the real, and conſequently of twelve times the value of the preſent maravedi. Under Alphonſus XI. the maravedi was ſeventeen times; under Henry II. ten times; under Henry III. five times; and under John II. two times and a half the value of the preſent maravedi.

MARAVI, in *Geography*, a country of Africa, with a city of the ſame name, built on the S. ſide of the lake, about 250 miles from the Indian ſea. S. lat. 13° 15′.—Alſo, a lake of Africa, in S. lat. 10°, of great extent, laid down by M. d'Anville as more than 350 Britiſh miles in length, but of inadequate breadth; ſome ſay 30 miles. This lake may perhaps, like that of Baikal, lie at the foot of the Table land on one ſide, as that of Aquilunda, of much ſmaller extent, does on the other.

MARAUTSCH, a town of Upper Carniola; 11 miles E. of Stein.

MARAUZGUIR, a town of Hindooſtan, in Myſore; 30 miles E.S.E. of Ouſſoor.

MARAWA, a town on the eaſt coaſt of the iſland of Banca. S. lat. 2 15′.

MARAWAR, a country of Hindooſtan, bordering on the coaſt oppoſite to Ceylon; about 60 miles in length, and 40 in breadth. It was conquered by the Britiſh troops in 1773, and the rajah killed. It is covered with thick foreſts, and little cultivated. In the flouriſhing ſtate of the empire of Hindooſtan, Marawar yielded a revenue of five covres of rupees.

MARAWIL, a town of the iſland of Ceylon, on the W. coaſt; 14 miles N. of Negombo.

MARAYAN, a town of Hindooſtan, in Bahar; 25 miles E. of Bahar.

MARAYAT BAY, a bay on the W. coaſt of the iſland of Luçon. N. lat. 14° 37′. E. long. 120° 21′.

MARAZION, or MARKET JEW, a market-town in the pariſh of St. Hilary, hundred of Penwith, county of Cornwall, England, is ſituated on the ſide and at the bottom of a hill, near an arm of the ſea, called Mount's bay, three miles E. of Penzance, and 286 W. from London. It derived its principal ſupport, if not its origin, from the reſort of pilgrims, and other devotees, to a neighbouring ſacred edifice on St. Michael's Mount; but that attraction being counteracted by the changes of opinion which commenced at the Reformation, and the then new town of Penzance drawing within its vortex many merchants and tradeſmen, with their connections and dependants, the conſequence of Marazion decreaſed. By ſome authors its name is derived from the Jews, who are reported to have traded here ſeveral centuries ago, and to have held an annual market for ſelling various commodities, and purchaſing tin and other merchandize in return. Richard, king of the Romans, granted two fairs to this town, for the benefit of the priory at St. Michael's Mount; but this charter was ſuperſeded by another in the thirty-ſeventh year of queen Elizabeth, by which the government of the town was veſted in a mayor, eight aldermen, and twelve capital burgeſſes, with power to hold one weekly market and two annual fairs. In the preamble to this charter it is ſtated, that "Marghaſiewe was a trading borough of great antiquity;" from which expreſſion, and from a corroborating correſpondence between the ſheriff of Cornwall and the mayor of Marazion during Cromwell's protectorate, it ſeems probable that this town was anciently repreſented in parliament. Two members were actually elected and returned in Cromwell's time; but they do not appear to have taken their ſeats: the endeavours of the inhabitants to regain their dormant rights proved ineffectual. In the Survey of the year 1801, purſuant to act of parliament, Marazion was ſtated to contain 224 houſes, occupied by 1009 perſons. The trade conſiſts chiefly in the importation of timber, coals, and iron, for the uſe of the inhabitants of the place, and for the neighbouring mines. The pariſh-church of St. Hilary is nearly two miles diſtant from the town: but here is a chapel of eaſe, ſupported by private ſubſcription. Quakers and Methodiſts have alſo their reſpective meeting-houſes.

Between Marazion and St. Michael's Mount is a place called the Chapel Rock, where the pilgrims who came to viſit the priory of St. Michael performed certain devotionary ceremonies, in a kind of initiatory chapel previous to their admiſſion to the more ſacred Mount.

The

The peculiar ſituation of St. Michael's Mount, and the ſingular character it aſſumes from appearing to riſe immediately from the waves, intereſt the imagination of the obſerver; though, when viewed from the land, its magnitude is apparently diminiſhed, from the vaſt extent of the horizon, and the expanſe of water which ſurrounds its baſe. At high tides it appears a completely inſulated aſſemblage of rocks, riſing to a conſiderable height, and gradually decreaſing in ſize, till, aſſiſted by the tower of the chapel on the ſummit, it aſſumes the form of a perfect pyramid. At low water it may be approached from the ſhore over a cauſeway of ſand and rock, which is ſubmerged by every riſing tide, and the Mount again rendered a perfect iſland. Some of the maſſes of rock in the intermediate ſpace are very large, and all are compoſed of granite of a cloſe texture, with its feldſpar of a pink colour. The Mount itſelf conſiſts of a hard granite, in which tranſparent quartz is the preponderating ſubſtance. The origin of the Mount, and its firſt conſecration to religious purpoſes, are unknown: the earlieſt time in which it appears on record, as a place of devotion, is the fifth century; though it ſeems probable that it was then highly celebrated, as St. Keyna, a holy virgin, daughter of Braganus, prince of Brecknockſhire, is ſtated to have come hither on a pilgrimage about the year 490. Upwards of 500 years afterwards, Edward the Confeſſor founded on this ſpot a priory of Benedictine monks, on whom he beſtowed the property of the Mount. This priory was held in high eſtimation, and was formed with peculiar privileges by pope Gregory, in the year 1070. King Henry VI. granted the priory to King's college, Cambridge; and it was afterwards beſtowed by Edward IV. on the nunnery of Sion, Middleſex. At the diſſolution, its revenues, valued at 110*l.* 12*s.* *per annum*, were conferred, together with the government of the Mount, then a military poſt, on Humphry Arundel, eſq. a branch of the family from which the preſent lord Arundel is deſcended. After ſeveral transfers, it was, about the cloſe of the ſeventeenth century, ſold to John St. Aubyn, eſq., whoſe deſcendant, ſir John St. Aybyn, bart. ſtill poſſeſſes it. The Mount has been the ſcene of ſeveral military tranſactions: the earlieſt recorded was in the reign of Richard I. when it was fortified in ſupport of prince John, then earl of Cornwall, in his endeavours to uſurp the throne during the king's abſence in the Holy Land, or his ſubſequent impriſonment in Germany. "From this time forward," Carew ſays, "this place continued rather a ſchoole of Mars than a temple of peace." It was a long time defended againſt Edward IV. by John, earl of Oxford, in behalf of king Henry. During the Corniſh inſurrection in the reign of Edward VI. the Mount was the refuge of many of the ſuperior families, who were here beſieged by the rebels. The civil contentions in the reign of Charles I. were the cauſe of the fortifications of the Mount being increaſed, till, according to an hiſtorian of that time, they were "impregnable, and almoſt inacceſſible." They were, however, reduced, after a vigorous defence by the king's adherents, in April 1646, by colonel Hammond, who obtained great celebrity by a ſervice of ſuch difficulty and danger. This was the laſt military occurrence that took place on this romantic ſpot, whoſe inhabitants appear to have been then driven away; for at the commencement of the laſt century, here was but one dwelling-houſe beſides the fortreſs. The improvements that have ſince been effected, and the increaſe of the buildings, are to be attributed to St. John St. Aubyn (grandfather of the preſent baronet), who, about the year 1726, rebuilt and enlarged the pier, ſo as to contain upwards of fifty ſmall veſſels. The ſecurity thus given to fiſhing-boats, induced ſeveral inhabitants of Marazion to erect ſome houſes at the bottom of the rock: the number has been ſince augmented to ſeventy, occupied by about 250 perſons. The circumference of the Mount is rather more than a mile; and its height, from the ſand to the top of the chapel-tower, as aſcertained by Hadley's quadrant, is 250 feet, being 48 feet higher than the Monument in London. The diſtance from the ſhore at Marazion is about 400 yards. The aſcent to the top of the Mount is by a ſteep and craggy paſſage fronting the north, defended about the midway and near the top by batteries. The whole ſummit is occupied by the remains of the ancient monaſtic buildings, which have been improved and beautified by the preſent poſſeſſor, under whoſe direction the chapel has been repaired. Beauties of England and Wales, vol. ii.

MARBAA, a town of Arabia; 10 miles W. of Mecca.

MARBACH, a town of Saxony, in the circle of Erzgeburg; 8 miles N. of Freyberg.—Alſo, a town of Auſtria, near the Danube; 9 miles S.W. of Aggſbach.

MARBACK, a town of Sweden, in the province of Smaland; 20 miles E.S.E. of Jonkioping.

MARBASIS, in *Botany*, a name given by ſome to a kind of plant which they ſay climbed up trees, and there hung down from their branches in form of long jointed and naked filaments.

The word ſeems to be only a corruption of the word *anabaſis* of Pliny, which he calls alſo *ephedra*, and gives the ſame character to.

The marbaſis of the ancients ſeems to mean our *uſnea*.

MARBECK, John, in *Biography*, organiſt of Windſor. The premature reforming zeal of this muſician nearly made a martyr of him, in the time of Henry VIII. He had indeed the honour of being brought to the ſtake, with three other perſons, who were actually burnt for hereſy; but was pardoned at the interceſſion of ſir Humphrey Forſter.

Fox, in his "Acts and Monuments," and Burnet, "Hiſtory of the Reformation," give a circumſtantial detail of the troubles in which Marbeck was involved, on account of religion. He however ſurvived Henry, and not only ſaw the reformation completed, but in 1550 was the firſt to publiſh the whole Engliſh cathedral ſervice, including the preces, prayers, and reſponſes, ſet to muſical notes under the title of

The Booke of Common Praier, noted 1550. Imprinted by Richard Grafton, Printer to the Kinge's Majeſtie, *cum privilegio ad imprimendum ſolum.*

Marbeck was admitted, in 1549, to the degree of bachelor in muſic, at Oxford, according to Anthony Wood (Faſts Oxon.) who erroneouſly calls him James Marbeck. He is honourably mentioned by Bate, becauſe he had been perſecuted by the Catholics; and his name is omitted by Pitts, for the ſame reaſon. See Music a Cappella, and Chanting.

MARBELLA, in *Geography*, a ſea-port of Spain, in the province of Granada, on the coaſt of the Mediterranean, beautifully ſituated in a valley, with its harbour ſcreened from the E. wind by a promontory, and defended by a caſtle, which is furniſhed with ſome guns. The exports from this town are wine, dried raiſins, leather, black ſtone, charcoal, and wood. In its neighbourhood is an extenſive ſugar plantation; 26 miles S.W. of Malaga. N. lat. 36° 31'. W. long. 4° 59'.

MARBEUF, a town of the iſland of Corſica; 10 miles W.S.W. of Vico.

MARBLE, in *Technical Mineralogy*, thoſe finer varieties of granular and compact limeſtone, which, being of a cloſer grain, are ſuſceptible of a ſuperior poliſh, and are remarkable either for their whiteneſs, or the beauty and variety of their colours. In former times the appellation of *Marmor* (derived

rived from the Greek μαρμαιρειν, *to ſhine*, or *glitter*, and afterwards corrupted to *marmol*, *marmel*, *marble*, *marbre*,) was indiſcriminately given to many ſtony maſſes that admit of being poliſhed, and accordingly we find alabaſter, ſerpentine, baſalt, porphyry, &c. deſcribed under that name, which is now confined to ſuch maſſive carbonats of lime as come under the above definition; which, however, does not exclude the varieties containing foreign ſubſtances imbedded in, or mixed with, the principal calcareous maſs, ſuch as ſerpentine, hornblende, quartz, &c.

Moſt of the external, phyſical, and chemical characters of the pure marbles are, of courſe, the ſame as thoſe of *compact and granular Limeſtone*; which ſee.

Marbles are eaſily diſtinguiſhable from gypſeous and calcareous alabaſters, with which they are frequently confounded; from the former by the application of ſome diluted nitric or muriatic acid, which produces a ſtrong efferveſcence, by expelling the carbonic acid; from the latter (which belong to ſtalactitical limeſtone, and are, therefore, acted upon in the ſame manner by the acids) by inferior hardneſs, a ſlighter degree of tranſlucidity, and, if coloured, by the abſence of regularity in the ſtripes and undulations that characteriſe the calcareous alabaſter: nor is the latter ever found in maſſes of conſiderable dimenſions.

The ſpecific gravity of marble varies in the ſame manner as that of the different varieties of common limeſtone, whence no diſtinctive character can be derived from it: Wallerius and Gmelin ſtate the ſpecific gravity of the former to be leſs, while others conſider it as greater than that of common limeſtone; but, according to Gerhard and other writers, it is, on the whole, equal in both.

Some granular marbles, when cut into thin ſlabs, exhibit a degree of elaſticity or flexibility, ſimilar to that of the well-known ſandſtone found in Brazil. This phenomenon was firſt obſerved in ſome pieces of marble preſerved in the palace of prince Borgheſe at Rome. But afterwards another marble, (of the variety called Dolomite,) having the ſame property, was diſcovered by Fleuriau de Bellevue, in the Val-Levantine of mount St. Gothard. Dolomieu (who deſcribed the Borgheſe marble) is of opinion that this property is owing to a ſtate of deſiccation which has leſſened the adherence of the molecules of the ſtones; and Fleuriau de Bellevue has proved this conjecture to be well founded, not only by the appearance and nature of the ſtone he diſcovered on St. Gothard, but alſo by his imparting the ſame property to ſeveral inflexible varieties of marble by merely expoſing them to ſuch a degree of heat as produced complete deſiccation. Some wrought granular (ſtatuary) marbles acquire a ſimilar property after a long expoſure to the action of the atmoſphere and the ſolar rays; a circumſtance which ſometimes takes place in ſtatues, cauſing thereby the more projecting parts to exfoliate, and to crumble to pieces. Dolomieu has firſt made this obſervation on an Italian marble called *Betullio*.

The various tints of the uni-coloured and variegated marbles, are generally produced by oxyds of iron, the ſolution of which has, either wholly or partially, penetrated the maſs previous to its complete induration. Blue and green marbles often owe their tints to minute particles of hornblende; this is the caſe, for inſtance, with the ſlate blue variety called *turchino*, and with ſome green German marbles. The black varieties are coloured by charcoal, and alſo by bitumen, when they paſs into ſtinkſtone. In marbles containing petrifactions, theſe appear ſometimes to have derived their colour from the ſame fluid which coloured the maſs; while at other times the colour of the ground is quite different from that of the petrifactions it contains.

All that has been ſaid of the fracture of granular and compact limeſtone, is applicable to marbles; but it is often difficult to draw the line between the two former. In general it may be ſaid, that the white ſtatuary marbles belong to the granular, and many of the variegated to the compact. Nor is it in all caſes eaſy to determine whether a given ſpecimen belong to the older or newer formation of limeſtone. It is, therefore, evident, that the diviſion of marbles into primary, with ſhining fracture, and into ſecondary, with dull fracture, is far from being practically uſeful; indeed, many varieties of marbles, as for inſtance, moſt of thoſe of the Hartz, &c. cannot be referred to either.

Baumer, Bertrand, Scopoli, Daubenton, Gmelin, and others, have arranged the varieties of marble after the colours they preſent; but this ſyſtem muſt neceſſarily aſſign two or more different places to one and the ſame kind of marble, variable in the number of its colours, and is, therefore, applicable only to ſmall ſpecimens. A far more convenient and uſeful diſtribution is the one adopted in the "Traité des Pierres précieuſes, &c." by Brard, whom we ſhall follow in the preſent article. The marbles are by this author divided, according to their localities, into claſſes, and theſe ſubdivided each into eight diſtinct diviſions, *viz.*

1. Uni-coloured marbles: this diviſion contains only the white and the black marbles.

2. Variegated marbles: thoſe with irregular ſpots and veins.

3. Madreporic marbles: this diviſion, eſtabliſhed by Faujas, comprehends all marbles containing remains of madrepores, or of related animals which generally preſent themſelves in the ſhape of white or grey ſpots, with regularly diſpoſed dots and ſtars in the centre.

4. Shell marbles: marbles that contain only a few ſhells, and are not, like

5. Lumachella marbles, entirely compoſed of ſhells.

6. Cipolin marbles: containing veins of greeniſh talc.

7. Breccia marbles: formed by a number of angular fragments of various marbles united by a cement. Theſe are ſubdivided into *ſmall breccias*, with ſpots having generally leſs than an inch in diameter; and into *large breccias*, with the generality of ſpots exceeding that dimenſion.

8. Puddingſtone marble: formed, like the breccias of fragments united by a cement, but which, inſtead of being angular, are rounded.

A. *Antique Marbles.*

Antique marbles are ſuch as were made uſe of by the ancients, and the quarries of which are no longer known. The moſt remarkable of theſe, both on account of their beauty and the uſe made of them in the arts, are

Parian marble (Lychnites of the ancients). Of a yellowiſh-white colour; texture fine ſcaly; ſcales ſhining and placed in all directions. Dipœnus, Scyllis, Malas, and Micciades employed this marble, and were imitated by their ſucceſſors. The ancients called it lychnites, becauſe its quarries were wrought at lamp light. The principal ſtatues of Parian marble ſtill extant are, the Venus of Medicis, Diana venatrix, Venus leaving the bath; the coloſſal Minerva (called Pallas of Velletri), Ariadne (called Cleopatra), Juno (called Capitolina), &c. It is alſo Parian marble on which the celebrated tables at Oxford are inſcribed. See Arundelian and Parian *Marbles*.

Pentelic Marble, from mount Penteles near Athens. This marble much reſembles the preceding, but is more denſe and fine-grained; it ſometimes exhibits faint greeniſh zones, produced by greeniſh talc, whence the Italian name *Cipolino ſtatuario*. The principal monuments of Athens were of Pentelic

telic marble, ſuch as the Parthenon, the Propylees, and the Hippodrome. Among the ſtatues of this marble in the Napoleon Muſeum, at Paris, are the Torſo; a Bacchus in repoſe; Jaſon, (called Cincinnatus); a Paris; the Diſcobolus repoſing; the bas-relief known by the name of the Sacrifice; the throne of Saturn; the tripod of Apollo; and the two beautiful Athenian inſcriptions known by the name of "Nointel Marbles," becauſe M. Nointel cauſed them to be brought from Athens to Paris in 1672.

Greek white Marble. The marble to which the ſtatuaries of Rome give the name of *Marmo Greco*, is of a very bright ſnow-white colour, cloſe and fine-grained, and of a hardneſs which is rather ſuperior to that of other white marbles. It takes a very fine poliſh. This is one of thoſe varieties which, being found near the river Coralus, in Phrygia, were called coralitic or corallic marble by the ancients. According to Pliny it was found in Aſia, in maſſes of ſmall dimenſions; and Argenville maintains that a ſimilar kind occurs on mount Caputo, near Palermo, in Sicily. The Greek marble was obtained from ſeveral iſlands of the Archipelago, ſuch as Scio, Samos, &c.; that of the iſland of Leſbos or Metelin ſometimes preſents ſpots on its ſurface. Among the ſtatues of this marble in the Napoleon Muſeum, the moſt remarkable are; a Bacchus, Zenon the philoſopher, as alſo the buſt known by the name *Faune à la tache*. Brard obſerves that this latter buſt appears rather to be of the true Coralic marble of the ancients; and that the ſpot at the neck, from which the buſt has derived its name, is foreign to the marble, and cauſed by contact with a piece of copper. Some ſuppoſe the Apollo of Belvedere to be of Greek marble, but the general opinion is that it is marble of Luni.

Tranſlucid white Marble (Marmo *ſtatuario* of the Italians). This much reſembles Parian marble, but differs from it by its more conſiderable tranſlucidity. There are at Venice, and in ſeveral other towns of Lombardy, columns and altars of this marble, the quarries of which are perfectly unknown.

Flexible white Marble, of a beautiful white colour, and fine grain. There are five or ſix tables of it preſerved in the houſe of prince Borgheſe at Rome; their length is about two feet and a half, the breadth about ten inches, and the thickneſs a little leſs than three. They were dug up, as the abbé Fortis was told, in the feod of Mondragone. Being ſet on end they bend, oſcillating backward and forward; when laid horizontally, and raiſed at one end, they form a curve, beginning towards the middle; if placed on a table, and a piece of wood laid under them, they make a ſalient curve, and touch the table with both ends. We refer to what has been ſaid above reſpecting this property.

White Marble of Luni, on the coaſt of Tuſcany. It is of a ſplendent white, and of a fine and cloſe grain; it takes a very fine poliſh, and may be employed for the moſt delicate work, whence it was preferred by the Grecian ſculptors both to the Parian and Pentelic marbles. It appears to be even finer than that of Carrara, and is moreover free from thoſe grey veins which are not unfrequently found in the latter. Moſt mineralogiſts coincide in their opinion that the Apollo of Belvedere is of Luni marble; but the Roman ſculptors look upon it as Greek marble. Of the Grecian ſtatues of this marble in the Napoleon Muſeum, the moſt remarkable are, the Antinous of the Capitol; the Antinous in bas-relief; the bas-relief repreſenting the ceremony of the conclamation.

White Marble of Carrara, between Specia and Lucca. Of a fine white colour, but often traverſed by grey veins, ſo that it is difficult to procure middle-ſized pieces without them; its fracture is granular and ſhining, and its grain fine enough for the purpoſes of ſculpture. It is not ſo ſubject to turn yellow as the Parian marble. This marble, which is almoſt the only one made uſe of by modern ſculptors, was alſo quarried and wrought by the ancients, as is proved by the great number of antique ſtatues ſtill extant in this marble. Its quarries are ſaid to have been opened in the time of Julius Cæſar. At preſent its two principal quarries are thoſe del Pianello and del Polvazzo. In the centre of the blocks of this marble very limpid rock-cryſtals are ſometimes found, which are called Carrara diamonds. It is alſo ſometimes, like the Pentelic marble, traverſed by veins of a greeniſh talc, when it is called in Italy *Cipolinacio di Carrara*. The average price of this marble is ſeventy-two livres the cubic foot.

White Marble of Mount Hymettus in Greece. This is not a very pure white variety, but inclines a little to grey. Pliny informs us that Lucius Craſſus, the orator, was expoſed to the ſarcaſms of Marcus Brutus, becauſe he had adorned his houſe with ſix columns, twelve feet high, of Hymettian marble. The ſtatue of Meleagre, in the Napoleon Muſeum, is of this marble.

Theſe are the chief white marbles which the ancients uſed for the purpoſes of architecture and ſculpture. The Thaſian and Arabian are likewiſe mentioned as antique white marbles, but we are not acquainted with any monuments executed in them.

Black antique Marble (*Nero antico* of the Italians.) This differs from the modern black marbles by the ſuperior intenſity of its colour; ſo much ſo, that if placed beſide thoſe of Dinan and Namur, it makes them appear grey. It has been affirmed that the ancients procured this marble from Greece; what we know for certain is, that Faujas has rediſcovered quarries of real antique black marble that were wrought by the ancients, and of which the remains are ſtill to be ſeen at the diſtance of two leagues from Spa, towards Franchimont, not far from Aix-la-Chapelle. This marble is extremely ſcarce, and occurs only in wrought pieces.

Red antique Marble (*Roſſo antico* of the Italians, *Ægyptum* of the ancients.) This beautiful marble is of a deep blood-red colour, here and there with white veins, and if cloſely examined is found to be ſprinkled over with minute white dots, as if it were ſtrewed with ſand. Of this kind is the Egyptian Antinous in the muſeum at Paris. But the moſt eſteemed variety of roſſo antico is that of a very deep red, without any veins, ſuch as it is ſeen in the two antique chairs, and in the buſt of an Indian Bacchus, in the ſame muſeum. The white points, which are never wanting in the true red antique marble, diſtinguiſh it from others of the ſame colour, ſuch as the griotte, &c. It is not known from whence the ancients obtained this marble; the conjecture is that it was brought from Egypt. There is in the Grimani palace at Venice, a coloſſal ſtatue of Marcus Agrippa in roſſo antico, which was formerly preſerved in the Pantheon in Rome.

Green antique Marble (*Verde antico* of the Italians.) This may be conſidered as a kind of breccia, the paſte of which is a mixture of talc and limeſtone, and the dark green fragments are owing to ſerpentine more or leſs pure. The verde antico of the beſt quality is that of which the paſte is of a graſs-green, and the blackiſh ſpots are of that variety of ſerpentine which is called noble ſerpentine. This marble is much eſteemed in commerce, but large pieces of a fine quality are ſeldom ſeen. There are four fine columns of it in the Napoleon Muſeum; but much more beautiful ones are preſerved at Parma. It was known to the ancients under the name of marmor Spartum or Lacedæmonium. This verde antico, properly ſo called, muſt not be confounded with the

 marbles

marbles known by the names of *vert-de-mer*, or *vert d'Egypte*. The real verde antico is a breccia, and is never mingled with red ſpots, while thoſe juſt mentioned are veined marbles mixed with a dull red ſubſtance, which gives them a browniſh hue.

Red ſpotted green antique Marble.—Its ground is very dark green, here and there marked with ſmall red and black ſpots. It alſo contains fragments of entrochi changed into white marble. The quarries of this marble are loſt, and it is found only in ſmall pieces, which are made into tablets, &c.

Leek Marble (*Marbre poireau* of the French lapidaries). This is likewiſe a mixture of limeſtone and a talcoſe ſubſtance of a light green, ſhaded with a blackiſh-green, and related to ſerpentine. Its texture is filamentoſe, and as it were ligneous; its fragments are ſplintery. When poliſhed it exhibits long green veins. Like all other talcoſe marbles it ſoon decompoſes in the open air. There is a table of it in the hotel de la Monnoie at Paris. Its quarries are loſt to us.

Marmo verde pagliocco of the Italians. This marble, which is of a yellowiſh-green colour, is only found in the ruins of ancient Rome.

Marbre petit antique of the French lapidaries. It is traverſed by white and grey veins, the two colours being diſpoſed in uninterrupted threads; the tables made of this marble are irregularly ſtriped their whole length, which has a very fine effect. It is much eſteemed, and only made uſe of for inlaying ornamental furniture. Its quarries are unknown.

Blue antique Marble.—This belongs to the variegated marbles. It is of a reddiſh-white colour, with ſlate blue ſpots repreſenting feſtoons. It is very ſcarce, and only ſeen in ſmall tablets. The quarries of this marble are loſt.

Cervelas Marble.—Of a deep red, with very numerous grey and white veins, from the colour and diſpoſition of which its name is derived. It is much eſteemed in commerce, and is ſaid to be found in Africa

Yellow antique Marble (*Giallo antico* of the Italians.) Of this we have three varieties: the firſt has more or leſs the colour of the yolk of an egg, and is nearly of an uniform tint; the other is marked with black or deep yellow rings, and the laſt is merely a paler coloured variety of the firſt. Theſe different marbles, for which the Sienna marble is a good ſubſtitute, are found only in ſmall detached pieces, and in antique inlaid work. It is in this manner that the two tables of lazulite in the Napoleon Muſeum are ſurrounded by a border made of the deep yellow variety.

Red and white antique Marbles.—Theſe marbles, to which ſeparate names have been given, are not ſufficiently diſtinct from each other to require ſeparate articles. The following are from Ferber's letters: red and white marble, called *Porta ſanta fiorita*, becauſe it was employed for ornamenting the door of St. Peter's church at Rome.—*Seme ſanto*, or *Arlechino*, the ſpots of which reſemble ſeeds, is made uſe of for ſeveral holy buildings.—*Pavonazzo;* white with red ſpots reſembling ribbons.—*Marmo occhio di pavone;* red, white, and rather yellowiſh. Ferber mentions a number of other red and white antique marbles, ſuch as the Serpentelo, Roſſo annulato, Purichiello, Vendurino, Fiorito, Cotonello, &c. which are only found among the ruins of the ancient monuments in Rome.

Marble called *Grand Antique*. This variety, which is a breccia, containing ſome ſhells, conſiſts of large fragments of a black marble, united by veins or lines of ſhining white. This ſuperb marble, the quarries of which are loſt, is ſometimes found in detached pieces and wrought There are four columns of it in the muſeum at Paris. A leſs valuable variety is that in which the ſpots, inſtead of being an entire intenſe black, are of a grey colour.

Antique Cipolin Marble.—Cipolin is a name given to all ſuch marbles as have greeniſh zones cauſed by green talc; their fracture is granular and ſhining, and ſhews here and there plates of talc. They are never ſeen to contain marine bodies. The ancients have made frequent uſe of the Cipolin. It takes a fine poliſh, but its ribbon-like ſtripes always remain dull, and are that part of the marble which firſt decompoſes when expoſed to the open air. There are modern Cipolins as fine as that uſed by the ancients.

Purple antique breccia Marble (*Brèche d'Alep* or *d'Alet* of French lapidaries). This ſhould not be confounded with the African breccia. There is perhaps no marble, the colour and ſpots of which are ſo variable as that of the violet breccia. The following are the chief varieties. The firſt is that from which the name of the marble is derived; it has a purpliſh-brown baſe, in which are imbedded large angular fragments of a light purple colour, and others of a white colour. This firſt variety can be employed only in large works, on account of the ſize of its ſpots, which are ſometimes a foot in diameter. There is a beautiful table of it in the Muſée Napoleon. The ſecond variety is as it were the miniature of the firſt; it exhibits the ſame ſpots, but within a much narrower compaſs, ſo that it may be uſed for leſs gigantic works than thoſe for which the other is employed. The third variety is known in commerce by the name of roſe-coloured marble (marbre roſe); in this the ſpots, inſtead of being white and light purple, have a very pleaſing roſe colour. It is ſcarce and never ſeen in large pieces. The fourth, which is the moſt beautiful, appears, at firſt view, to be perfectly diſtinct from the others, but it is nevertheleſs a mere variety of the purple breccia: its ground is of a yellowiſh-green colour, and the ſpots, which are of various ſizes, are white, green, purpliſh, and yellow mottled with red; theſe various ſpots are traverſed by ſtraight lines of a greyiſh-white colour. This fourth variety is very ſcarce; there are, however, two tables of it at Paris, one at M. Faujas, the other in the poſſeſſion of M. Dedré. From one of the names by which this precious marble is known, we ſee that the neighbourhood of Aleppo in Syria is ſuppoſed to be the place where it is found; but this is erroneous, for Brongniart informs us that the name is derived from a place called Alet, near Aix, in France.

African breccia Marble, (called *antique African breccia.*) Its ground is black, variegated with large fragments of a greyiſh-white, of a deep-red, or of purpliſh wine colour; but theſe latter are always ſmaller than the former. This is one of the moſt beautiful marbles exiſting, and has a ſuperb effect when accompanied by gilt ornaments. Though rather leſs vivid in its colours than the preceding violet breccia, it is yet, upon the whole, more beautiful. Whether Africa is the part of the world where it is found, as its name implies, is not certain. The pedeſtal of Venus leaving the bath, and a large column, both in the Napoleon Muſeum, are of this marble.

Roſe-coloured antique breccia Marble—The baſe of this ſmall breccia is light red, and variegated with ſmall roſe-red ſpots, and other ſtill ſmaller ſpots of a deep black colour; there are ſome other middle-ſized ſpots of a beautiful white; the whole producing a very pleaſing mixture. This marble, of which the locality is entirely unknown, is very ſcarce, and only ſmall tablets are ſeen of it in collections.

Yellow antique Marble Breccia.—Two varieties may be united under this name; the one known in Italy by the name of *Giallo brecciato*, which is of a light yellow colour, ornamented

ornamented with much deeper coloured ſpots; the other, called *Breccia dorata*, preſents yellow ſpots ſeparated by red intervals, which contain ſmall white ſpots. Both are found only in ſmall pieces among the ruins of ancient Rome.

The Arlequin breccia, or *Brecciato traccagnina* of the Italians. The ground of this antique breccia, which, on account of the roundneſs of its ſpots, approaches to the pudding-ſtone marbles, is of a pale yellow, and contains a number of ſmall fragments of marble of all colours, which has procured it its name. There are two columns of it in the Napoleon Muſeum.

Red and white breccia Marble (*Breccia pavonazza* of the Italians.) Its baſe is white, the fragments are red. According to Ferber, the interior of the Muſeo Clementino is ornamented with this marble, the quarries of which are loſt.

Breccia di Porta Santa, ſo called from the uſe that has been made of it for adorning the door of St. Peter's church in Rome. It is a mixture of unequal, white, blue, red, and grey ſpots.

Marbre brèche vierge antique of the French lapidaries. This ſmall antique breccia, of a chocolate-brown colour, is ſpotted with a multitude of minute angular fragments of white marble, beſides which it contains ſome ſmall red ſpots. It is ſo ſcarce that only one tomb is known to exiſt of it in Rome. Small tablets of it are ſold at a very high price.

Peach bloſſom Marble (Marmo *fior di Perſica* of the Italians.) This antique marble is to be referred to the breccias, of which it has all the characters. It exhibits large purpliſh ſpots, united by a white cement. A column made of it is preſerved in the Napoleon Muſeum. Several other marbles paſs under the name *fior di Perſica*, that have no reſemblance to the one here deſcribed, which is very ſcarce. Brard ſuſpects that it is nothing but a variety of the purple breccia.

Yellow lumachella Marble, called alſo *lumachelle Caſtracani*. Its baſe is of a very deep brown colour, and contains a great number of ſhells, forming a ſort of well-defined ſmall circles of a very lively orange-yellow. This beautiful marble is very ſcarce, and occurs only in ſmall tablets. It is often called lumachella of Aſtrachan, and ſuppoſed to be found in the neighbourhood of that city; but this is erroneous. D'Argenville and others affirm that ſmall pieces of it are dug up among the ruins of ancient Rome.

Black and white antique lumachella Marble, (called *panno di morto*, the funeral pall.) Its baſe is of the deepeſt black, ſprinkled with white ſhells, like ſnails, from an inch to eighteen lines in length, and diſtributed rather regularly all over its ſurface. This ſhell-marble, the locality of which is unknown, ranks among the fineſt of its kind, on account of the beauty of its colour, the neatneſs and diſtinctneſs of its ſpots, and the exquiſite poliſh it takes. It is, moreover, very ſcarce, a circumſtance which much enhances its value.

B. *Modern Marbles.*

British Marbles.

Great Britain is by no means poor in fine varieties of marble, as has been inſinuated by ſome writers on this ſubject; though, on the other hand, it muſt be confeſſed that thoſe are equally wide of the truth who imagine that its marmoric treaſures will ever rival thoſe of Italy, Spain, or France. There can be no doubt, however, that the number of Britiſh marbles we are at preſent acquainted with, will be conſiderably augmented when accurate reſearch ſhall have been extended to thoſe parts of the united kingdom, that are moſt likely to furniſh this intereſting ſubject of economical mineralogy.

English Marbles.

Black marble is found in Derbyſhire, at Aſhford, Matlock, and Monſaldale.

Black and white marble in the north part of Devonſhire; the varieties from Brideſtow, South Tawton, and Drewſteignton, are ſome black, others inclining to blueiſh-black. Some of the Chudley marble, and thoſe of Staverton and Berry pomeroy, have a black ground, with large veins of calcareous ſpar traverſing it in all directions; alſo red, ſtraw-coloured, and greeniſh veins are ſeen in it. Black with white veins occurs at Buckfaſtleigh, and black with yellow and white veins at Bickington, near Aſhburton, in the ſame county. Intenſe black marble, with diſtant white ſpots, is found alſo in Somerſetſhire.

The variegated marbles of Devonſhire are generally reddiſh, browniſh, and greyiſh, variouſly veined with white and yellow, and the colours are often intimately blended. At Waddon there is a quarry of dunniſh coloured marble veined with green; there is another at Cherſton. The marbles from Torbay and Babbacombe diſplay a great variety in the mixture of their colours, ſo much ſo that one and the ſame block often exhibits ſamples very diſtinct from one another both in tint and delineations.

The Plymouth marble is principally of two ſorts; one aſh colour, ſhaded with black veins; the other blackiſh-grey and white ſhaded, in concentric ſtripes interſperſed with irregular red ſpots.

The cliffs near Marychurch exhibit marble not only of great extent, but of ſuperior beauty to any other in Devonſhire; being for the moſt part either of a dove-coloured ground with reddiſh-purple and yellow veins, or of a black ground mottled with purpliſh globules. In a valley below the cliff, about 400 yards wide, there are looſe unconnected rocks of this marble, owing their ſituation probably to the falling down of the ground into the ſea; for there are very large rocks even on the beach. The huge fragments of rock ſcattered over the valley, by which we eaſily deſcend to the ſea, give it a groteſque appearance, and have been whimſically called a petrified congregation; and the pleaſantry of this fancy has been heightened by a rock, ſuppoſed to be about forty tons, in a very erect poſition, which has been, ludicrouſly enough, entitled "the parſon." Polwhele's Devon.

The green marble of Angleſea is not unlike the *verde antico*; its colours are greeniſh-black, leek-green, and ſometimes dull purpliſh, irregularly blended with white; but they are not always ſeen together in the ſame piece. The white part is limeſtone; the green ſhades are owing to magneſian ſtones, among which is alſo aſbeſt in narrow veins. This is an elegant marble, but apt to be interſected by ſmall cracks; nor is it ſuſceptible of a high poliſh in thoſe places where there are aſbeſtine veins. The quarry is ſituated on the lands of Monachy-ty, in the pariſh of Llan-Fair-Ynghornwy, and is found again in the iſle of Skerries, off this pariſh.

There are ſeveral fine varieties of marble in Derbyſhire, particularly ſuch as are compoſed of petrifactions. The largeſt quantity of the mottled grey marble is got in the neighbourhood of Moneyaſh. It may be diſtinguiſhed into two kinds; the ground of the one is light grey, and that of the other has a ſlight blueiſh caſt. The former is rendered extremely beautiful, by the number of purple veins which ſpread upon its poliſhed ſurface in elegant and irregular branches. But the chief ornament of the mottled grey marble is the number of entrochi with which it abounds. The longitudinal and tranſverſe ſections of them produce an almoſt incredible variety in its figure. The purple veined marble is got at Ricklowdale near Moneyaſh; that with the blueiſh ground at the village itſelf. There is another variety at a ſmall diſtance from hence, at a place called Highlow; it is known by the name of *Birdeye marble* (Pilkington.) The marble of Purbeck, in Dorſetſhire, is compoſed of fragments of ſhells, united by a compact limeſtone, partly of a yellow colour, and mingled with a greeniſh martial earth, and black and yellowiſh particles of bitumen.

A ſhell marble, which is far from being beautiful, but which in former times has been much employed for architectural purpoſes, is the *Petworth marble*, from a place of that name in Suſſex. It is thus deſcribed by Woodward: "The ground grey, with a caſt of green. 'Tis very thick ſet in all parts of it with ſhells, chiefly turbinated. Some of them ſeem to be of that ſort of river ſhell that Dr. Liſter (Hiſt. Cochl. Angl. p. 133.) calls *cochlea maxima, fuſca ſ. nigricans, faſciata*. Several of the ſhells are filled with a white ſpar, which variegates and adds to the beauty of the ſtone. That ſpar was caſt in the ſhell before this was repoſited in the maſs of marble, as is demonſtrable from a view of this and other like maſſes. This is of about the hardneſs of the white Genoeſe marble. The ſlender round ſcapi of the pillars of the abbey church in Weſtminſter, and of the Temple church, are of this ſort of marble. So likewiſe are thoſe of the cathedral church of Saliſbury. Some perſons that are leſs ſkilful in theſe matters, fancy theſe ſcapi that occur in moſt of the larger Gothic buildings of England are artificial, and will have it that they are a kind of fuſil marble, caſt in cylindric moulds. Any one who ſhall compare the grain of the marble of thoſe pillars, the ſpars and the ſhells in it, with thoſe of this marble got in Suſſex, will ſoon diſcover how little ground there is for this opinion, and yet it has prevailed very generally. Camden has entertained the ſame notion of thoſe vaſt ſtones of Stonehenge; but is fully refuted by Inigo Jones. Stonehenge reſtored, p. 33."

Scottish Marbles.

Scotland abounds in marbles, but only a few of them are generally known. A particularly fine variety of white marble is found, in immenſe beds, at Aſſent in Sutherland, out of which blocks of any ſize may be cut. The beſt ſort is ſeen in the bed of the river, about a mile or two ſouth of the church.

Mr. Williams, in his Natural Hiſtory of the Mineral Kingdom, points out ſeveral other places where he has ſeen excellent varieties of marble. An exquiſite ſaline marble of a pure white occurs near Blairgowrie in Perthſhire, not far from the high road ſide, towards the north; it may be eaſily raiſed in blocks and ſlabs perfectly free of blemiſhes, and in every reſpect fit to be employed in ſtatuary and ornamental architecture.

Another white marble, compoſed of fine ſhining broad grains, like ſpangles, may be ſeen in the duke of Gordon's lands, in the foreſt of Glenavon; but the ſituation is remote and difficult of acceſs.

A beautiful aſh-grey marble, of a fine uniform grain, and ſuſceptible of a fine poliſh, preſents itſelf in Lochaber, on the north ſide of the ferry of Ballachyliſh. It is finely ſprinkled throughout with grains of bright pyrites, and alſo contains diſſeminated lead ore of a fine texture, which to the eye appears to be rich in ſilver. This marble is capable of being raiſed in blocks of any ſize.

A black variety flowered with white, is found in the farm of Blairmachyldach, about three miles ſouth of Fort William, in the bed of a river. It is of a cloſe grain, but not very hard; the flowering in it is light and beautiful, like fine needlework, or rather reſembling the froſty fretwork on glaſs windows in a winter morning; and diffuſed through all parts of the maſs.

A dark brown variety beautifully variegated with white, is mentioned by Dr. Meek, as being found in the pariſh of Cambuſlang, in the county of Lanark. Of this marble, which takes a very good poliſh, there are ſeveral ſlabs in the palace of Hamilton; a chimney-piece in the college library of Glaſgow, and three pair of ſolid *jambs* in Mr. Dundas's houſe at Duddinſtoun. The ſtratum, which has been hitherto ſeen, is from ſix to twelve inches thick, and extends over a conſiderable part of the pariſh.

Alſo the red and white marble of Boyne; and the white with long veins of a different tint from Durneſs, are mentioned by authors.

Profeſſor Jameſon deſcribes ſome varieties of marble found in the iſland of Skye. A white marble veined with aſh-grey; it is very heavy, and by expoſure to the air it waſtes down into a powder. An aſh-grey variety, variegated by beautiful lemon-yellow ſtripes which traverſe it in different directions, and which ſeem to be owing to an intimate combination of chlorite, or hornblende, with the marble. A variety of a pure white colour, with a ſlight admixture of blueiſh-grey, in which alone it differs from the fine marble of Carrara.

But one of the moſt beautiful varieties is that from the hill of Belephetrich in Tirie, one of the Weſtern iſlands of Scotland. It is now generally known by the name of *Tirie marble*. Its colour is pale blood-red, light fleſh-red, and reddiſh-white; theſe colours are often ſeen in one and the ſame piece: the darker ſhades generally as ſpots and waved ſtriæ. What renders this marble particularly curious is the hornblende, and the other green ſubſtance which it contains diſſeminated, and part of which appears to belong to that ſpecies of the hornblende family, which is now generally called ſahlite; the lighter coloured particles have been conſidered as corundum. It is mixed in different proportions with the marble, ſo as to produce pale blackiſh-green, dark aſparagus-green, and a colour approaching to leek-green. Alſo particles of calcareous ſpar are ſeen intermixed with this ſubſtance; as alſo ſmall rounded quartzy particles of a bright red colour, and ſome mica in plates. Some of its varieties have the appearance of granite.

Beſide this, profeſſor Jameſon mentions a white marble of the ſame kind, found with the one juſt mentioned; its colour is white, or very light blue; it contains ſcales of mica and cryſtals of hornblende, which latter, when minutely diffuſed, give the marble a green or yellowiſh-green colour, and when very intimately combined with the maſs, form beautiful yellowiſh-green ſpots.

Another intereſting variety of compact marble, is that of Iona, deſcribed by count Bournon. It is of a fine dull white, and has at firſt ſight the appearance of pure compact feldſpar. It is an intimate mixture of tremolite and pure compact carbonat of lime; ſometimes with yellowiſh or greeniſh-yellow ſpots, owing to a leſs intimate admixture of a ſteatitic ſubſtance. It occurs in magneſian rocks, ſometimes alternating with clayey and ſlaty ſteatite or magneſian ſlate.

A dark coloured ſhell marble occurs in the limeſtone quarries of the pariſh of Cummertrees in the county of Dumfries,

Dumfries, and large blocks of it (according to the anonymous defcriber of that parifh) have been worked up for chimnies and hearths, fome of which have been fent to London. The fhells and other petrified bodies with which it is mixed, greatly add to its variety and beauty, as the whole receives a very fine polifh.

Irish Marbles.

Ireland alfo has its valuable marbles, and quarries of them are wrought in various parts.

The variety beft known in England is the *Kilkenny marble*, with black ground, more or lefs varied with white marks produced by petrifactions. This marble contains a great variety of impreffions of madrepores, of bivalve and turbinate fhells: mytilites, turbinites, pectinites, tellinites, tubiporites, nautilites, and ammonites may be diftinguifhed. The fpar which occupies the place of the fhells, fometimes affumes a greenifh-yellow colour; in fome places there are fpots, though rarely, that reflect iridefcent colours; and fometimes martial pyrites is imbedded in the marble. A kind of flaw fometimes appears in the ftone, which, from its irregularly indented figure, is ftyled by the workmen a *fkull*, as it refembles the futures of a cranium.

The quarry of this marble, of which Mr. Tighe has given a full account, is called the black quarry: it is fituated in the limeftone diftrict of Kilkenny, half a mile fouth of the town, near the right bank of the river Nore. The ftrata of marble, each of which is known by its particular appellation, fucceeded in this order:

	Feet.	Inches thick.
Rock bed, about -	4	0
Thin bed - -	1	4
Silver bed, from -	1	6 to 2 feet.
Bad bed - -	2	0
Halfmoon bed -	2	6
Bottom bed - -	3	0
Lower thin bed - -	1	6
Black bed - -	1	8
Griddle bed - -	2	0

The halfmoon and the bottom bed are reckoned among the beft: the former is fo called from the number of impreffions of bivalve fhells which it contains; the fections of the fpaces they occupied, now filled with white fpar, being more or lefs lunated: the black bed and the filver bed are both efteemed. The marble which approaches neareft to black is moft valued at Kilkenny. The white marks on the polifhed ftone, it is faid, appear more ftrongly, or increafe, by long expofure to the air.

This marble, from experiments mentioned by Mr. Tighe, may be confidered as confifting of 97 *per cent.* mild calx, two *per cent.* carbon, and one *per cent.* magnefia and iron, of which the former is in the largeft proportion.

Some coarfe work of Kilkenny marble is finifhed at the quarry; a few of the blocks are fplit in the town by hand faws, where a little of the polifhed work is alfo done, and tomb-ftones are cut, which are raifed from a different quarry. But the principal work is done at the marble mill, which is on the left bank of the river, near two miles from Kilkenny.

The importation of the marble into England and Scotland has been hitherto prevented by a duty of two fhillings the cubic foot; what is exported, therefore, is in the rude block. Tighe's Survey.

The quantity exported is about fifty tons annually. The marble fent to Dublin is conveyed on cars as far as Leighlin bridge, where it is embarked on the Barrow; that which is exported is ufually fent to Waterford, and goes by land, at leaft as far as Thomaftown. The blocks exported are configned chiefly to Liverpool and Glafgow. Wakefield's Ireland.

Black marble, exceedingly fine, has been raifed at Crayleath, in the county of Down. It is fufceptible of a very high polifh, and, if well chofen, is free from thofe large white fpots which are fuppofed to disfigure fome of the Kilkenny marble. Dubourdieu's Survey.

In the county of Waterford different kinds of marble are difcovered, as at Toreen, a fine variegated fort, compofed of chocolate colour, white, yellow, and blue, blended into various fhades and figures, which takes a good polifh. A black marble, without any mixture of white, has been found near Kilcrump, in the parifh of Whitechurch, of the fame county; as alfo a grey marble beautifully clouded with white, fpotted like fome kinds of fhagreen, and fufceptible of a good polifh.

At Loughlougher, in the county of Tipperary, a fine purple marble is found, which, when polifhed, looks exceedingly beautiful. Smith.

There are feveral fine variegated marbles in the county of Cork; Smith defcribes one with purplifh ground, and white veins and fpots, found at Churchtown; a blueifh and white variegated marble, from the fame place, with which, and a black variety, like that of Kilkenny, the chancel of the parifh church is floored; feveral fine afh-coloured varieties of marble, as that of Caftle Hyde, &c.

The county of Kerry affords feveral variegated marbles, fuch as that found near Tralee, not unlike the Kilkenny marble, except that the white fpots are much larger, and the colour of the mafs is not of fo deep a black, but inclining more to the blue: it takes a fine polifh, and may be raifed in blocks large enough for tables, chimney-pieces, &c. Marble of various colours is found in the fame county, in the iflands near Dunkerron, in the river Kenmare. Some is black and white, others are purple and white, intermixed with yellow fpots, and fome beautiful fpecimens have been feen of a purple colour veined with dark green, refembling the veins in blood-ftone. Sir William Petty had feveral quarries opened in thefe iflands in his time, in order to carry on a marble manufactory; but they are now worked chiefly for the making of lime.

French Marbles.

Brard has given a very complete account of the numerous varieties of marble found in France, of which the following is an abftract:

Department of the Arriège: the black marble of Moulis, faid to have been known to the ancients. Purple breccia marble, from Seix, fimilar to the Italian purple breccia. There are feveral more fine varieties of marble found in this department, efpecially in the mountains called Du Cos.

Department of the Aude: the variety called *marbre de Languedoc*, or *de Sainte Beaume*; it is of a fiery red, with white and grey zones, formed by madrepores. The eight columns which adorn the new triumphal arch, in the Caroufel at Paris, are of this marble, which was formerly only employed for the decoration of the royal palaces. The quarries are at Sainte Beaume. The neighbourhood of Narbonne furnifhes feveral valuable marbles, fuch as that improperly called marbre de Languedoc, which is white mixed with blueifh-grey; a fhell marble of an intenfely black colour, with white belemnites; a purple marble with yellow fpots, &c. This department is particularly rich in marbles.

Department

Department of the Mouths of the Rhone: among the beautiful varieties of marble with which this department abounds are, the breccia marble of Marfeille, called *brèche de Memphis;* it is reddifh, and contains fmall white, grey, and brown fragments; a marble mixed of white, red, and yellow, known in the country by the name of marbre de Sainte Beaume, but very diftinct from the marble of the department de l'Aude, to which this name properly belongs.

Department of Calvados: a marble of a dirty red, with large, grey, or white veins, compofed of madrepores, called *marbre de Caen*, from the place where it is quarried; tables made of it are very commonly feen in the coffee-houfes, &c. of Paris.

Department of the Côte d'Or: befides feveral fpotted and breccia marbles, there are found in this department two varieties of lumachella, the one of a reddifh-yellow, the other of a grey colour, both of which are known in commerce under the name of *lumachelles de Bourgogne.*

Department of the Herault: one of the moft efteemed French varieties of marble is that called *griotte*. Its colour is a deep brown, with blood-red oval fpots, produced by fhells. This marble has obtained its name from its brownifh colour, being fimilar to that of a variety of cherries, likewife called griotte; but it alfo fometimes contains large white veins, which are fituated in a tranfverfal direction to the other fpots, and which, as deftroying the harmony of the other tints, are confidered as a defect. The lapidaries dignify the variety which is deftitute of thefe white veins with the epithet *Italian;* but the fact is, that both varieties occur in the department of the Herault, and that neither of them is found in Italy. Some of the ornaments of the triumphal arch of the Caroufel are made of griotte; which is now much employed in the decoration of public monuments, and of fplendid furniture. It is fold at about 200 francs the cubic foot. Several other varieties of marble are found in the fame department, and ufed at Montpelier and in other neighbouring places.

Department of the Ifère: a light grey marble, with fragments of a lively rofe-red of different fhades, and with fpots of a chocolate-brown colour, from Tenfin in Dauphiné. This fine marble takes a good polifh.

Department of Jemappes: the madreporic marble of Mons, called *petit gris*, or *petit granit* by lapidaries; its colour is blackifh-grey, dotted with grey-coloured fragments of madrepores. There are many more varieties of marble in this department, but moft of them not employed in commerce.

Department of Maine and Loire: a grey and white marble veined with red, improperly called peach-bloffom marble.—Grey, with white veins, known by the name of marble of Angers.

Department of Montblanc: a fhining white marble, with grey veins, at Pons-de-la-Bride; being mixed with filiceous earth it has the property of giving out fparks with the fteel; it is alfo much harder and more folid than the common marbles, and its fpecific gravity is greater. The Romans have employed it for the conftruction of feveral of their monuments. A breccia marble, called *brèche de Tarentaife:* it confifts of a purple bafe, with fmall fragments of white, yellow, and fometimes blackifh marbles. This marble, which is found at La Villette, above Moutier, is much efteemed, both on account of its fine colour, and the fuperior polifh it takes. Alfo, a yellow breccia marble, not unlike fome antique varieties, is found in this department.

Department of the North: a white and reddifh-brown marble, with white, afh-grey, and blue veins, called *marbre de Rance*, from the place in Hainaut, where it is found. It is efteemed on account of its beauty, and as an article of commerce. The black marble of Barbançon, with white veins, the grey variety with black fpots, and white and aurora red veins from Clermont, the breccia marbles of D u'ers, and Eftroing-la-Rouillie, are alfo among the many valuable varieties furnifhed by this department.

Department of the Ourthe: the grey and white variety with blood-red fpots, called *marbre de Hon*, is well known. It comes from the neighbourhood of Liege, and is made ufe of for tables, chimney-pieces, vafes, &c.

Department of the Straits of Calais: a yellowifh-brown marble, with white, grey, and yellowifh-red veins, has been lately difcovered at Boulogne, and employed for the conftruction of the column placed there in commemoration of the victories of the French emperor, whence it has obtained the name of *marbre Napoléon*. Its ftructure is lamellar in fome places, and compact in others. It takes a good polifh, and, what adds much to its value, it may be procured in very large blocks, which, though folid, are of very moderate weight: the cubic foot weighing about 180 pounds. There are feveral other varieties of marble furnifhed by this department, fuch as the brocatello of Boulogne, the marbles of Stingal, Lingeu, &c.

Departments of the Pyrenees: the marble of Bayonne in the Lower Pyrenees, (called there *marbre vierge*, on account of its whitenefs) is rather lefs fine-grained than Carrara marble. It is ufed in thofe parts for purpofes of fculpture, but has the defect of turning yellow and fpotted in a fhort fpace of time. More generally known is the *marble of Campan* in the High Pyrenees; this is a mixture of limeftone and a talcofe fubftance, which latter forms the entangled veins obfervable on its furface. There are three varieties of Campan, which, however, are often united in the fame piece; the firft, called *green Campan*, is of a very pale fea-green colour, and exhibits on its furface lines of a much deeper green, and forming a kind of network; the fecond, called *Ifabel Campan*, is of a delicate rofe colour, and, like the firft, furnifhed with undulated veins of green talc; the third variety, the *red Campan*, is of a deep red colour, with veins of a ftill deeper red, and in fome meafure refembles fome parts of the griotte. In order to form a correct idea of the Campan marble, properly fpeaking, we muft imagine that thefe three varieties are united, fo as to form large ftripes of from a few inches, to two, three, or even fix feet wide, which produce a very grand and pleafing effect when viewed in large maffes. Where, therefore, the Campan marble can be employed in the large way, it may be looked upon as the moft beautiful and fplendid of all marbles. It fhould not, however, be expofed to the weather, fince, by fo doing, the talcofe fubftance exfoliates, and leaves hollow places, which render its furface uneven and rough; but it anfwers extremely well in the interior of buildings, for chimney-pieces, flabs for tables, &c. There are immenfe quarries of this valuable marble at Campan, near Bagnère, in the High Pyrenees. The marble of Sarencolin, in the High Pyrenees (in the ci-devant Gafcogne) exhibits on its furface large ftraight zones and angular fpots of a yellow or blood-red colour, fo that at firft view it bears fome refemblance to the marble called Sicilian. This is commonly known by the name of *Sarencolin* or *Sarancolin;* that of fuperior beauty has become fcarce, and it is even faid that the quarry which yielded the moft perfect fort is entirely exhaufted. The marble vulgarly called *brèche Caroline* appears to be nothing but a modification of the Sarencolin. The variety of marble called *marbre d'Antin*, has a white ground, and exhibits at its furface fire-red veins, which

which fometimes produce very pleafing appearances. It is found at Verey, in the High Pyrenees. According to M. de Cambry it derives its name from the Celtic words *an tin* (of fire) or fire marble. In the High Pyrenees a moft beautiful breccia is likewife found, the mafs of which is of a light orange colour, containing fmall fragments of a brilliant whitenefs. It takes an excellent polifh, and may be manufactured into vafes, tablets, &c. The breccia, called *brèche des Pyrenées*, is likewife held in great efteem; its bafe is brownifh-red, and exhibits black, grey, and red middle-fized fpots. It admits of a good polifh. Befides thofe here enumerated, a number of other marbles are met with in the Pyrenees, than which no chain of mountains is richer in fine varieties.

Department of the Sambre and Meufe: the colour of the marble of Dinan is a fine black, but perhaps inferior in point of intenfity to that of the antique black marble. It is ufed in fculpture: the arabefques in relief which ornament the church of St. Vaudrin at Mons, are made of it. There are two other black marbles found in this department, *viz.* that of Theux and that of Namur; the former, which is fprinkled with grey dots, is wrought with facility, and takes a very good polifh, but emits a flightly fulphureous odour when rubbed or ftruck with a hard body; the latter, which often inclines to greyifh-black, and is traverfed by grey veins, is exported to Holland in fquare flabs, and conftitutes a valuable article of commerce. All thefe black marbles are in great requeft for the flooring of churches, for tomb-ftones, &c. The grey marble of Sainte Anne fprinkled with white fpots, the remains of madrepores, has been much ufed at Paris for tops of commodes, chimney-pieces, tables, &c.; but ever fince the introduction of the unfightly marble from Jemappes, called petit granit, it has greatly funk in eftimation. The breccia marble of Vaulfort, between Dinan and Givet, alfo known by the name of *brèche de Dourlais*, has a reddifh bafe with black, grey, and white fpots; the pillars in the church of Saint Roque are covered with large flabs of this marble, which is fufceptible of a good polifh.

Specimens of the preceding varieties, and of the following Batavian marbles, are in the ftar of the rotunda before the library of the Central School (*ci-devant* palace of the governors of the Netherlands) at Bruffels: marble of Agimont, near Namur; brownifh-red mixed with grey, traverfed by thick white veins.—Of Avennes-le-Seigle near Valenciennes; a white ftatuary marble, eafily to be wrought, and becoming harder when expofed to the air.—Of Bourtombe; pale blue and reddifh, with large white clouds.—Of Bray, near Roculx, dep. of Jemappes: deep grey, mixed with white.—Of Clermont, near Valcourt, Sambre and Meufe; pale grey, with large white fpots.—Of Devignes, pale grey, fhaded with deep grey, and marked with fome white fpots.—Of Dourlaipe; a calcareous breccia with reddifh-grey bafe, incrufted with grey fragments of different fhades and fizes.—Of Eftrée, near Namur; a mixture of blueifh-grey and pale grey, with whitifh veins.—Of Franchimont near Florenne, Sambre and Meufe; pale red and pale blue, with white veins.—Of Fiery-le-petit, between Mons and Namur; white, with yellow and grey granular fpots.—Of Gerfontaine, pale red fhaded with blue, and traverfed by large white veins.—Of Goghenée near Florenne, Sambre and Meufe; pale reddifh-grey, waved with red in equal portions.—Of Grofghoux; dark grey, fhaded with pale grey, with fmall white veins.—Of Haire, near Charlerny; pale blue and pale red, in clouds, with large white fpots.—Of Lorraine; blueifh-grey, a little veined with grey and white.—Of Limburg; brown, with white granular fpots, appearing like fmall belemnitæ.—Of Mouchène; greyifh and white blended, with natural fiffures.—Of Ourdin near Valenciennes; a white marble for ftatues and architectural ornaments.—Of Pegagne; blueifh-grey, with large white fpots.—Of Rancé; near Beaumont, dep. of Jemappes; reddifh with various veins; ufed for chimney-pieces.—Of St. Renir, near Luxemburg; red, with brown, green, and blue veins, being one of the moft beautiful marbles in Europe. It fometimes contains Mytili and other fhells.—Of Renly; red and grey in large clouds, with white veins and fpots.—Of Royailles; grey fhaded, with white veins.—Of Roy-Soire, Sambre and Meufe; pale grey, with white zigzag ftripes.—Of Solré; greyifh-blue, with many white veins. Another variety from the fame place, of a blueifh-grey bafe, with differninated fmall white fhells.—Of Somme; grey fhaded, with fome white veins; with natural fiffures.—Of Strée, near Thuin, Jemappes; grey veined, with white fpots.—Of Thuillé, near Thuin; dark grey, with white veins, and fragments of fhells.—Of Vaufart; pale blue, fhaded pale red, with white ftripes.—Of Zoude-Bart; dark grey with fmall clouds, mixed with grey and white.

Department of the Lower Seine: feveral varieties of yellow marbles, ftreaked with darker yellow, and exhibiting black dendritæ, are found at St. Etienne, near Rouen: they are capable of a good polifh, and M. Tory has invented an economical mode of polifhing them.

Department of the Seine and Marne: an elegant marble called *Chateau-London*, of a very pale yellow, containing fmall inconfpicuous fhells and white tranflucid veins, has but lately been difcovered in this department. The beautiful bridge of Namours is conftructed of it.

Department of the Var: the highly efteemed marble called *Portor*, on account of the brilliant yellow veins in its deep black ground; the moft beautiful variety comes from St. Maximin.

Department of the Vofges: an excellent quarry exifts near Framont, in the mountain called the Mathifkopf, in which the marbles are difpofed in horizontal beds; their principal colours are white, penetrated by red or black, and grey.

Department of the Po: a white ftatuary marble, of a finer grey than that of Carrara, is found at Ponté, near Turin; of this marble are conftructed the maufoleums of the kings of Sardinia in the vaults of the church de la Supergue, near Turin.—*Verde di Sufa* is a green and white marble, refembling the verde antico; it is found at Suza, in Piemont.—*Marmo di Gaffino*, called fo from the place near Turin where it is found, is light grey fpotted by fhells which are eafily detached from the mafs; beautiful columns have been made of it.

The territory of GENOA furnifhes feveral beautiful varieties of marble, the moft remarkable of which is the *polzevera di Genoa*, called alfo in French *vert d'Egypte* and *vert de mer*. This marble is a mixture of granular limeftone, with a talcofe and ferpentine fubftance difpofed in veins; but fometimes thefe latter fubftances conftitute by far the greater part of the whole, while the white granular limeftone appears only here and there in veins and patches. It is fometimes mixed with a reddifh fubftance. This marble was formerly much employed in Italy, France, and England for chimney-pieces, &c.; but owing to its fombre appearance is come into difufe.

CORSICA poffeffes, among other varieties, a good ftatuary marble of a fine and clofe grain, and pure milky whitenefs, quarried at Ornofrio; it is comparable to that of Carrara.—Alfo a grey marble (bardiglio), a cipolin, and

and ſome other varieties occur in Corſica. The iſland of Elba has immenſe quarries of a white marble with blackiſh-green veins.

Among the innumerable varieties of ITALIAN MARBLES the following deſerve more particular notice.

The *rov[illegible]io* is a white marble found at Padua; it is uſed for architectural purpoſes, but is inferior in quality to thoſe of Carrara and Genoa.—The white marble of St. Julien, at Piſa, is of a finer grain than that of Carrara, but takes no good poliſh; the cathedral and the celebrated tower of Piſa are conſtructed of this marble.—The Biancone marble is white with a ſlight tinge of grey; it is quarried at St. Gregoire, Magurega, &c. and chiefly employed for altars and tombs. Near Mergozzo the white ſaline marble with grey veins is found, with which the cathedral of Milan is built.—A white marble ſprinkled with little ſpots and dots of blood red, occurs at Luni, on the coaſt of Tuſcany.—Another white variety variegated with red and yellow ſpots and veins, is found in different parts of the Venetian territory.

The black marble of Bergamo is called *paragone* (derived from the black colour of touchſtone); it is the moſt pure and intenſe tint, and ſuſceptible of a fine poliſh.—The black marble of Como, in the Milaneſe, is alſo greatly eſteemed on account of the intenſity of its colour. Near the lake of Como and at Valerano, there are, likewiſe, quarries of excellent black marble, which has been employed in the cathedral of Sienna.

The *polveroſo* of Piſtoya is a black marble ſprinkled with dots, which gives it the appearance of being covered with duſt; there are beautiful ſlabs of it on the walls of the famous chappel of San Lorenzo.—A moſt beautiful white marble with black ſpots from the Lago Maggiore, which has been employed for decorating the interior of many churches in the Milaneſe.

The Margorre marble, found in ſeveral parts of the Milaneſe, is blueiſh veined with brown. Part of the dome of the cathedral of Milan is built of this marble.

The green marble of Florence owes its colour to a copious admixture of ſteatite. Another green marble, called *verde di Prado*, is found near the little town of Prado, in Tuſcany; it is marked with ſpots of a deeper green than the reſt, and paſſing even into blackiſh-blue.

The beautiful *Sienna marble*, or *brocatello di Siena*, has a yellow colour reſembling the yolk of an egg, and diſpoſed in large irregular ſpots, ſurrounded with veins of blueiſh-red, paſſing ſometimes into purple. It is by no means uncommon in this country. At Montarenti, two leagues from Sienna, another yellow marble is found, which is traverſed by black and purpliſh-black veins. This is frequently employed throughout Italy.—The marble of Brema is yellow with white ſpots.

The *mandelato* of the Italians is a light red marble, with yellowiſh-white ſpots, found at Lugezzana, in the Veroneſe. Another variety, bearing the ſame name, occurs at Preoſa. They are both employed for columns and various other works.—The red marble of Verona is of a red, rather inclining to yellow, or hyacinth; that of a brighter red, and which contains ſome ammonites, is highly eſteemed, and the tomb of Petrarca, at Arquo's, recently engraved by Faujas, is of this variety; the other variety, of a dull red, has been employed by the Romans, as may be ſeen, for inſtance, in the vaſt amphitheatre of Verona, which is entirely built with it. Another marble is found near Verona, which Faujas calls *oſſeous marble*, becauſe he ſuppoſes the large white ſpots in the reddiſh and greeniſh paſte to be owing to the remains of bones, of which they ſtill retain the figure. Very fine columns have been made of this marble.

Another Italian ſhell-marble is the *occhio di pavone*, the ſhells of which form large orbicular ſpots, red, white, and blueiſh. According to Da Coſta, the peacock's eye is of a bright cinnabar colour, with ſpots and veins of milk-white ſpar; many of the ſpots, forming circles about the ſize of a ſixpence, are filled with a red ground, and from an imaginary reſemblance have conferred the name. (P. 213.) A madreporic marble, known under the name of *pietra ſtellaria*, much employed in Italy, is entirely compoſed of ſtar madrepores, converted into a grey and white ſubſtance, and is ſuſceptible of an excellent poliſh.

Among the Italian breccia marbles are: the violet, called in France *brèche d'Italie*, the ground of which is reddiſh-brown, veined white; it is a beautiful marble, but requires much care, ſince it becomes ſoon ſpotted by coming into contact with greaſy ſubſtances. The village of Bretonico, in the Veroneſe, furniſhes a ſplendid breccia marble, compoſed of yellow, ſteel-grey and roſe-coloured ſpots. That of Bergamo conſiſts of black and grey fragments, in a greeniſh cement.

Florence marble, alſo called *ruin marble*, is a calcareous *marle*; which ſee.

SICILY abounds in marbles. Baron Borch, in his Sicilian mineralogy, deſcribes upwards of a hundred varieties, of which the following appear to be the moſt important.

The principal and moſt valuable marble of Sicily is that frequently called *Sicile*, or *Sicile antique*, and by Engliſh ſtonecutters *Sicilian jaſper*; it is red, with large ſtripes like ribbons, white, red, and ſometimes green, which here and there revolve, forming petty acute angles. At Biſachino a milk-white and an apple-green variety occur; both take a fine poliſh. Trapani preſents a red marble with deeper red ſpots, and another with green ſpots: at the ſame place is found the variety called *bigio bianco*, being grey with white ſpots, another ſpotted with ſeveral colours; and one (called *pidochioſo*), formed by the union of ſmall red and yellow grains or ſpots.—That of Caſtronuovo is yellow ſpotted with red.—Taormina furniſhes ſeveral varieties: red with black ſpots; red with white veins, and deeper red ſpots; greeniſh mixed with bright brown ſpots; purpliſh, with particular reflections. The marble of Santa Maria del Boſco is of a deep black with yellow veins, not unlike that called *Portor*. At Termini we find a greeniſh marble with white veins and red dots. Near Sciacca they quarry a bright green marble, waved with deeper green and yellow.

Among the Sicilian breccia marbles are thoſe of Gallo, the one of a light grey colour, preſenting elegant roſe-coloured ſpots of ſeveral ſhades; and the other alſo grey, veined yellow, and exhibiting on its ſurface white tranſlucid ſpots. The breccia marble of Monte Alcano is light grey, with round and roſe-coloured ſpots. That of Taormina has a deep red ground, and preſents at its ſurface yellow and greyiſh-white ſpots.

SPANISH MARBLES.

Spain rivals Italy in the abundance and beauty of its marbles. The vicinity of Valencia, Cadiz, Burgos, Grenada, Molina, Carthagena, offer a great number of them. A mountain entirely compoſed of beautiful marbles exiſts at the diſtance of three leagues from San Felipe; the Tagus takes its courſe partly through hills of marble that conſtitute its bed, and the Carpentine mountains are equally provided

provided with them. Hence it is that the monuments of antiquity in Spain, thofe of the middle ages, and of modern times, are profufely decorated with indigenous marbles. The vault of the beautiful theatre of Toledo is fupported by 350 marble columns. The mofque of Cordova, erected by caliph Abdoulrahman III., is ornamented with 1200 columns, moft of which are of Spanifh marble: among the ruins of ancient Merida (Augufta Emerita), which was built 28 years before Chrift, fragments of the moft valuable marbles are ftill difcovered; and finally, the church of the Efcurial, and the palace itfelf, are decorated with the moft beautiful marbles, and the fame may be faid of the principal churches of Madrid.

The milk-white marble of Cordova is very fit for fculpture; it has a fine grain and takes a good polifh. Near Filabres, three leagues from Almeria, in Grenada, there is a mountain of about a league in circumference, and 2000 feet in height, which is entirely compofed of the pureft white marble, capable of the fineft polifh. The rocks which furround the town of Molina, in New Caftile, are compofed of a white marble, which has been employed in the palace of the Alhambra, at Grenada. The white faline marble of Grenada is flightly tinged with red. Alfo the white marble of Badajoz has rather a reddifh tint, but its grain is finer and clofer than that of the preceding. A white variety with large grey fpots, at La Mancha, in New Caftile. A greyifh marble is quarried at Toledo, and one, grey with white veins and fpots, at Elvira.

The black marble of La Mancha is of a very intenfe colour, and fufceptible of a high polifh. Another of the fame colour is found near Segovia, and a deep black variety with grey dots at Moron. Bifcay furnifhes a black marble veined with white, and another of greyifh-black colour with yellow veins: this latter is often called *Spanifh portor*, but it is much inferior in beauty to that from St. Maximin, in the department of the Var.

A beautiful deep red variety, with fhining white and bright red fpots and veins, called *red Seville marble*.—Flefh-coloured, veined with white, from Santiago; and an entire mountain of this kind near Antiguera.—A dull red marble, with black capillary veins, found in Meguera, in Valencia, is much employed in Spain for tables.—Near Molina there is an entire hill of a red, yellow, and white marble, with granular and brilliant fracture, like fugar.—The mountains of Guipufcoa furnifh a red marble veined with grey, and clofely refembling that of Serancolin: Patrin even conjectures that it may be of the fame bed. At Cortegana, in Andalufia, a fawn-coloured variety powdered with grey.

The violet marble, fpotted with bright yellow, from Tortofa, is much admired on account of its fine colours and the polifh it takes.—A marble of a dull violet colour, like winelees, with orange-yellow angular fpots, is found near Valencia; it is not fufceptible of a high polifh.—A green marble, refembling the verde antico, prefents itfelf at Grenada.

Near Morviedro there is a hill of black marble, veined with white, which, towards the fummit, gradually paffes into a yellowifh-blue and reddifh breccia.—A beautiful breccia marble is found at Riela, in Arragon; it confifts of angular fragments of a black marble imbedded in a reddifh-yellow bafe.—The breccia of Old Caftile is of a bright red, dotted with yellow and black, and inclofes middle-fized fragments of a pale yellow, brick-red, deep brown, and blackifh-grey: it is much employed at Paris.

One of the moft celebrated Spanifh marbles (which may be regarded as a fhell-marble), is the *brocatello*; its chief colour is claret-red, variegated with numerous fmall fpots, and points of ifabell-yellow, yellowifh-grey, and a tranflucid white. All the greyifh fpots in this marble, when clofely examined, prove to be fragments of fhells, but the irregular yellow and red fpots are not owing to remains of organic bodies. The name of brocatello is given to all thofe marbles that refemble gold cloth and embroidered filk ftuffs of the fame kind.

Portuguese Marbles.

Portugal appears to be poor in marbles; there are, however, feveral varieties mentioned by authors; fuch as that of Villa-viciofa, in Alentejo, fpotted with grey, and (as Bowles has it) refembling the marble of Mount Atlas. The chain of mountains of Arrabeda, in Eftremadura, likewife furnifhes fome efteemed marbles.—The marble of Troncao is pale yellow, with greyifh veins, and contains alfo remains of marine bodies.

The church of Alfara is built with marble of Cintra, a village on a mountain feven leagues diftant from Lifbon.

Swiss Marbles.

The marbles of Switzerland, at leaft thofe which are objects of commerce, are not numerous; nor is there great variety of colours among thofe few that are found in its mountainous regions.

At Roche, near Aigle, in the canton (now department) of Leman, is a quarry of a marble veined with red, white, grey, and black; it is wrought on the fpot, and is almoft the only fort ufed at Geneva, and all over the Pays de Vaud: polifhed flabs of it are fent as far as Lyons. It often prefents pectinites and madreporites, which have affumed the nature and grain of marble, fo that the fhells feldom or never appear in their original form.

The localities of fome other marbles, which we know to be Swifs, are not indicated by any writer on the mineralogy of Switzerland. There was formerly a marble mill at Bern, from which the fineft varieties found in Switzerland were fent into France, Germany, and England; but this we fuppofe does no longer exift.

German Marbles.

The marbles of Germany are very numerous, and many of them far more beautiful than thofe foreign kinds which its wealthier inhabitants are fo eager to obtain. A great number of them are even left unnoticed in the writings of topographical authors of that extenfive country.

Auftria, fo rich in mineral treafures, excels alfo in the number and variety of its marbles.

The moft efteemed of thofe of Lower Auftria are the marbles of Schottwien, of Lilienfeld, Seitenftätten, and the Kammerguth. That of Lilienfeld is of an intenfe black colour.

Thofe of Stiria (of Lambrecht, Röthelftein, Zell, Maria-troft, &c.) are of the firft quality.

Carinthia has fome fine white marbles, and alfo poffeffes the moft beautiful of all known fhell-marbles, *viz.* that of Bleyberg, called *fire-marble*, or *opalefcent lumachella*. The colour of the marble itfelf is not particularly ftriking; it is brownifh-grey, fhaded with a darker tint, which latter belongs to the fragments of fhells of which the mafs is chiefly compofed. But what diftinguifhes this variety of fhell-marble from all others, are the opalefcent fragments of a fpecies of nautilus, here and there diffeminated in its mafs: the tints which they reflect are red, green, and blue, of confiderable intenfity. This moft efteemed of all varieties of lumachellas is feldom feen in large pieces. The

 greateft

greateft variety of boxes and other articles made of it, exifts in the collections of Vienna.

In Carniola are found, among others, a flefh-coloured and grey marble, veined with white and blue; nearly the fame as that called by the Italians *Marmo breccia antica grifata*.—A yellow and dark red variety, with fhrub-like veins; the fame with that improperly called *Diafpro di Sicilia a vene*.—A pudding-ftone marble, with pale red bafe, including grey and whitifh rounded pieces; the fame as the *Marmo breccia catinata* of the Italians.—A flefh-red marble, traverfed by fome calcareous fpar, and called by the neighbouring Italians *Palmone di Porta Santa;* this is the moft common variety of marble in thofe parts.—A black marble occurring in beautiful perpendicular ftrata; it is ufed for architectural purpofes.—A white marble, not unlike that of Carrara, but mixed with dirty fpots; nor can it be quarried in large blocks. Hacquet mentions feveral white varieties in other parts of Carniola, equalling and even furpaffing the Carrara marble in whitenefs and delicacy of ftructure.

Of Bohemian marbles, the fineft white variety is that of the circle of Königfgrätz; and among the variegated we have thofe of Czeftin, Koftel, and Sternberg, in the circle of Kaurzim. But ftill finer are thofe in the circle of Beraun: thus we have at Telin a brown-red, at Hermanomierftiz a light blue, at St. Juan a red and yellow, and red and white variety; the marble of Kofors is black, with imbedded petrifactions, belemnites, entomolithus paradoxus, &c. Alfo Karlftein and Dobrzichowitz of the fame circle furnifh fine varieties of marble. That of St. Juan only is found in fmall pieces; all the others occur in confiderable beds.

Moravia, though lefs rich in marbles than Bohemia, ftill furnifhes fome very valuable kinds in thofe of Hoftienitz, in the circle of Brünn, and of Niklafburg (which latter is a beautiful lumachella); not to mention feveral others, the quarries of which are not wrought.

In Franconia we have the rich quarries of Hoff, which, among others, yield a fine black marble, a curious liver-brown variety with red fpots, a fea-green, blueifh, and feveral kinds of red marble. The marbles of Bayreuth prefent a great diverfity of colour and delineation, and are of a fine clofe grain. There is a manufactory of various articles in thefe marbles, at the houfe of correction, in the capital of the principality.

The Hartz mountains in Lower Saxony produce fome good marbles. Thofe of Blankenburg have been defervedly praifed, on account of the pleafing colours they exhibit; there are fome of a beautiful black, with ftraight and orbicular white ftripes; others of the fame colour, and with green and white fpots; others with red fpots; grey varieties, with white, brown, and red fpots; and numerous red marbles, variegated with white, brown, greenifh, and other colours. Several of thofe with a black, grey, and brown ground, contain madrepores and corallites. There were marble mills at Blankenburg, but there is very little employment for them at prefent.

At Langenftein, near Halberftadt, they quarry a very fine marble, another of a light green colour, and two white ones, with large brownifh-red and yellow fpots, of a fine appearance.

Norwegian Marbles.

Several of them are mentioned by Pontoppidan in his Hiftory of Norway, but it is dubious whether the worthy prelate has been correctly informed in this particular. Indeed, according to Mr. Neergard, there is only one quarry in Norway, *viz.* that of Gillebeck, feven leagues diftant from Chriftiania; but as the marble which it furnifhes is faturated with a great quantity of pyrites, it generally becomes decompofed in a few years. The great church of Frederick, at Copenhagen, which is unfinifhed, is built with this marble. Neergard has often feen fome pretty tablets of it, which contained garnets and actinote.

Swedish Marbles.

Only a few of thefe are mentioned by authors, fuch as that found in the province of Jemtland, which is black and white, and alfo of an unmixed black; that of Kolmorden, in the province of Eaft Gothland, compofed of white granular limeftone and ferpentine. Neergard has given us an account of the quarry of Fagernech, fituate between the two little towns of Norkiöping and Nykiöping, and about thirty leagues from Stockholm. It belongs, at prefent, to Mr. Eberftein, and to baron Unger, who purchafed it from count Gyllenberg for only 200,000 francs, on account of its bad condition. This marble, which is white, with veins of green talc, the fracture brilliant, began to be wrought about 150 years ago, in the reign of queen Chriftina. The fpace where it is found is about 2000 fathoms in length, but its breadth is inconfiderable. They make of it tomb-ftones, flabs for tables, vafes for butter, falt cellars, and mortars; and the fale of thefe different articles amounts annually to about 20,000 francs. There are magazines of it at Stockholm, at Gottenburg, at Carlfcrona, and at Abo. The manufactory employs about twenty workmen, who receive each two livres ten fous daily; and its pofition is fine and well adapted for working, as it is near the Baltic fea.

In the parifh of Pargos, near Abo, in Finland, a very fine white marble is faid to occur.

Russian and Siberian Marbles.

The vaft Ruffian empire may naturally be fuppofed to abound in marble quarries; they are found in the Finnic and Taurian mountains, on the Caucafus, in the Ural, the Altaic, Sajanic, Krafnojaric, and Dauric mountains; in the northernmoft parts of Siberia, on the fea of Ochotzk, at the Penfhinfk bay, on Tfhutfkoinof, Kamtfhatka, the Kurile and Aleutean iflands. The following varieties are enumerated in Georgi's "Befchreibung des Ruffifchen Reichs:" white faline marble in the Olonfk mountains, near the lake Gifh, where there is a quarry near Tifdowa; alfo on Novaga Semla. A greyifh variety, with needles of fhorl, in the Onega iflands; and another of the fame colour, with green fpots, on the banks of the Onega. A greyifh-white faline marble, containing much tremolite in fafcicular and radiating acicular cryftals, in the quarry of Tifdowa. White fcaly marble is found in various parts of the Ural and Altaïan mountains, in the Kirgeefe Steppe, in Nertfchinfk, &c. &c. Pearl-grey, glimmering, granular limeftone on the Ui and Tagil of the Tobol; in the Siberian marble quarries. Blueifh-grey granular marble, with copper green, on the banks of the Lower Tfhuflowaja. Grey-clouded marble, near the Pereguba of the Onega; in the marble quarries of Catherineburg, &c. Brown granular marble on the banks of the Irtifh, near Jempalat; near Tfhittinfk, in Nertfchinfk. Black faline marble, at Kexholm; a variety of the fame colour, but confiderable hardnefs, in the vale of Alufhta, in Tauris. A blackifh-green variety, refembling ferpentine, on the banks of the Tfhuftowaja, at Severfkoi Sawod, and in the Guberlinfkian Ural. A light green variety in Dauria, at Kiächta; and another of the fame colour, with dark green fpots, on Janfa, an ifland island of the lake Ladoga. Reddish saline marble at Olonez. Dark red marble in Klimezkoi, one of the Onega islands, also in the Ural of Catherineburg. A variety of a light red colour, on the Argun of Dauria. Red saline marble, with brown stripes, near the Ui of Tobol, at Atagul, where it is quarried in large blocks. Yellow saline marble in the northern Ural, in the bay of Caria, near the Isel of Tobol, on the banks of the Irtish, at Jamushewa. A greyish-yellow variety, with dendritæ, near the lake Ilmen. Dark and light red saline marble, with white veins, in the Olonefki quarries. Blackish-brown, with white veins, on the banks of the Onega. White marble, with black veins, on the banks of the Donez, at Bachmut. A grey variety, with white veins, on those of the Ik, at Wosnesenskoi Sawod. Greyish, with red veins, on those of the Tura, at Turinskoi Sawod. Red, with white veins, also dark green striped marble, in the Ural of Catherineburg, &c. White marble, with veins of white calcareous spar, and shorl-like spots, at Catherineburg. Blackish-grey marble, with veins of quartz, near the Loktewka, in Kolywan, and the Kokbukta of the Upper Irtish. A blackish-blue variety, with white veins of spar, at Nertshinskoi Sawod. Black saline marble, with brown stripes, at Tiwdewa, in Olonez. Marble, with stripes of various colours, in the mountains of Kolywan, the Ural, and Kirgeese mountains. Marble, with dots of various colours, in Olonesk, near the Ui of Tobolsk, &c. Spotted and flamed marble of various colours in Tiwdewa, on the banks of the Ladoga, in various parts of the Ural, &c. Black marble, with yellow spots, at Nertshinsk. Clouded uni-coloured and variegated marble, mostly with grey for its base, in the quarries of Finnland and Catherineburg. This is quarried in very large blocks: it is very durable, and therefore employed for the construction of balconies, &c. in the imperial palaces. Scaly marble, of a white colour, mixed with red, in Finnland, on the banks of the lake Gish, in the Ural. The same, of a grey colour, mixed with red, having dark spots, on an island of the lake Lishma, &c. A blue variety, mixed with red, on the northern banks of the lake Ladoga. Parti-coloured marble, a mixture of greenish, blackish, and white, at Kiächta, in the mountains of Dauria, &c.

Patrin, who during a residence of eight years examined the mineral treasures of those regions, has given the following account of the Siberian marbles. The Ural mountains furnish the finest and most variegated marbles. The greater part is taken from the neighbourhood of Katerinburg, where they are wrought, and from thence transported into Russia, and particularly to Petersburgh. The late empress caused an immense palace to be built there for Orlof her favourite, which is entirely coated with these fine marbles, both inside and out. This empress built the church of Isaac with the same marbles, on a vast space, near the statue of Peter the Great. This church was not finished in 1787. Patrin saw there columns of very large dimensions, which seemed to be of a single block, of a white and blueish marble in large veins. Only this kind of marble was used in that church. The palace of Orlof has many varieties, which are distributed in compartments. Patrin found no white statuary marble in the Ural mountains; but in that part of the Altaian mountains which is traversed by the river Irtish, he in two places saw enormous rocks of marble, perfectly white and pure, from which large blocks might be hewn. The only use made of it is to convert it into lime for the service of the fortresses situated along the Irtish.

ASIA is probably very rich in marbles, but they are little known.

Shaw makes mention of a red marble with dendritic delineations from mount Sinai.

Of Syrian marbles we have no other account but that given in Russel's Natural History of Aleppo. They have at that city an inferior kind of yellow marble, which takes a tolerable polish, and is used for the ornamental parts of buildings, and for paving the court-yard. But a variety of other marbles is brought from parts more distant. From Damascus they receive a red marble; thence also and from Khillis, a coarse black sort; and from Antioch they procure various ancient fragments. The common Aleppo marble is brought to resemble the Damascus red by rubbing it with oil, and letting it stand some hours in an oven moderately heated.

Some Persian marbles are mentioned by Chardin, particularly a translucent white one. Mr. Morier, in his interesting "Journey through Persia, &c." just published, mentions the latter under the name of marble of Tabriz. The tomb of Hafitz, the celebrated Persian poet, is constructed with this beautiful substance; and the wainscotting of the principal room of the Hafl-ten, near Shiraz, is likewise of Tabriz marble: one of the largest slabs is nine feet in length and five feet in breadth. Its colours are described, by this author, as a combination of light greens, with here and there veins of red and sometimes blue; he adds that it is not procured near the city of Tabriz, or taken from a quarry, but that it is said to be rather a petrifaction found in large quantities, and in immense blocks, on the borders of the lake Shahee, near the town of Meraugheh. We should take this substance to be a variety of calcareous alabaster, were not the size of the pieces above-mentioned against this supposition.

The marbles of Hindoostan are unknown to us, and the same may be said of those of Siam and China: we are told that in the latter the streets of some towns are paved with marbles of all colours, and most public buildings, bridges, and monuments are constructed of it. Mention is made by authors of a quarry of white marble in the neighbourhood of Pekin. Laboubère speaks of a quarry of a beautifully white marble near the capital of Siam.

Some of the antique AFRICAN MARBLES have been mentioned in their proper place. A slate-blue variety (according to Brongniart) is still found at Sitifi in Mauritania; it is called *turchino*, or *marbre bleu turquin*, on account of its colour, which Tondi has found to be owing to the amphibole by which the marble is penetrated.

AMERICA.

There are many curious varieties of marble in North America. The chief quarries in the territories of the United States are at Stockbridge and Lanesborough, Massachusetts; in Vermont and Pennsylvania; in New York, and in Virginia: some of which are said to equal the finest kinds from Europe. At Marble town, near Hudson river, are quarries of fine black marble, spotted with white shells.

Marble of various qualities, (as professor Hall informs us,) has been found in many places on the west side of the green mountains in Vermont. A few years since a valuable quarry was discovered in Middleburg, a town situated on Otter Creek, eleven miles above Vergennes. The quarry forms one bank of the creek for several roods, and extends back into the side of a hill to a distance at present unknown. The stone lies in irregular strata, varying considerably in thickness, but all more or less inclined to the north-west. The marble is of different colours in different parts of of the bed. On one fide it is a pure white, and of a quality little, if at all, inferior to Italian white marble; but this feems to conftitute but a fmall portion of the whole mafs. The colour that predominates through moft parts of the quarry is a grey of different intenfities. The marble of both kinds is folid, compact, free from veins of quartz, and fufceptible of an excellent polifh. A mill of peculiar conftruction has been erected for the purpofe of fawing the ftone into flabs. It contains fixty-five faws, which are kept almoft conftantly in operation. During the years 1809 and 1810 thefe faws cut out 20,000 feet of flabs, and the fales of marble tables, fideboards, tomb-ftones, &c. in the fame period, amounted to about 11,000 dollars.

Part of the marbles of South America will probably be illuftrated in Von Humboldt's travels in thofe interefting regions. Thofe of Chili, defcribed in Molina's work on the natural hiftory of that part of South America, are of various kinds. The varieties of a fingle colour hitherto difcovered are, white ftatuary marbles, black, greenifh, yellow, and grey. Two mountains, the one in the Cordelera of Copiapo, and the other in the marfhes of Maule, entirely confift of marbles in zones of feveral colours; but in fuch ftrata as furround the mountains, from their bafe to the fummit, with a fymmetry that feems an artifice of nature. The variegated marbles are the grey with white, yellow, and blue veins; green, fpeckled with black; and yellow with black, brown, and green irregular fpots. This latter, the quarry of which is at San-Fernando, the capital of the province of Colchagua, is in great efteem, becaufe it is eafily wrought, and hardens in the air. All the marbles of Chili are generally of a good quality, and all take a good polifh. Perfons who have had occafion to examine the Lower Andes, have affured Molina that thofe mountains abound in marbles of different qualities, and nearly of all colours. In the plains near the city of Coquimbo a white fhell marble has been found, fomewhat granular, three or four feet under the vegetable earth. The fhells in it are more or lefs entire. The bed of this marble extends in length and breadth more than three miles; its thicknefs, generally about two feet, varies, and depends on the number of the beds, which are fometimes five, fometimes eight. Thefe beds are almoft always divided by very thin layers of fand. This ftone increafes in hardnefs in proportion to its depth: the firft beds only prefent a coarfe friable ftone, of no ufe but to make lime; the following, although compact, eafily yield to the iron inftruments ufed to cut it, and raife it from the quarry; but in building acquire a fufficient hardnefs to refift any impreffion of the air or water. Molina, p. 77.

Marbles, *Artificial.* The ftucco, whereof they make ftatues, bufts, baffo-relievoes, and other ornaments of architecture, ought to be marble pulverifed, mixed in a certain proportion with plafter; the whole well fifted, worked up with water, and ufed like common plaifter. See Stucco.

There is alfo a kind of artificial marble made of the flaky felenites, or a tranfparent ftone, refembling plafter; which becomes very hard, receives a tolerable polifh, and may deceive a good eye. This kind of felenites refembles Mufcovy talc.

There is another fort of artificial marble, formed by corrofive tincture, which penetrating into white marble to the depth of a line or more, imitate the various colours of other dearer marbles

There is alfo a preparation of brimftone in imitation of marble.

To do this, you muft provide yourfelf with a flat and fmooth piece of marble: on this make a border or wall, to encompafs either a fquare or oval table, which may be done either with wax or clay. Then having provided feveral forts of colours, as white-lead, vermilion, lake, orpiment, mafticot, fmalt, Pruffian blue, &c. melt on a flow fire fome brimftone, in feveral glazed pipkins; put one particular fort of colour into each, and ftir it well together; then having before oiled the marble all over within the wall, with one colour quickly drop fpots upon it of larger and lefs fize; after this, take another colour and do as before; and fo on, till the ftone is covered with fpots of all the colours you defign to ufe. When this is done, you are next to confider what colour the mafs or ground of your table is to be: if of a grey colour, then take fine fifted afhes, and mix it up with melted brimftone; or if red, with Englifh red ochre; if white, with white-lead; if black, with lamp or ivory black. Your brimftone for the ground muft be pretty hot, that the coloured drops on the ftone may unite and incorporate with it. When the ground is poured even all over, you are next, if judged neceffary, to put a thin wainfcot board upon it: this muft be done whilft the brimftone is hot, making alfo the board hot, which ought to be thoroughly dry, in order to caufe the brimftone to ftick the better to it. When the whole is cold, take it up, and polifh it with a cloth and oil, and it will look very beautiful. Smith's Laboratory, p. 248.

Marble, *Colouring of.* The colouring of marbles is a nice art, and in order to fucceed in it, the pieces of marble, on which the experiments are tried, muft be well polifhed, and clear from the leaft fpot or vein. The harder the marble is, the better it will bear the heat neceffary in the operation: therefore alabafter, and the common foft white marble, are very improper to perform thefe operations upon.

Heat is always neceffary for the opening of the pores of the marble, fo as to render it fit to receive the colours; but the marble muft never be made red-hot, for then the texture of the marble itfelf is injured, and the colours are burnt, and lofe their beauty. Too fmall a degree of heat is as bad as too great: for, in this cafe, though the marble receives the colour, it will not be fixed in it, nor ftrike deep enough. Some colours will ftrike, even cold; but they are never fo well funk in as when a juft degree of heat is ufed. The proper degree is that which, without making the marble red, will make the liquor boil upon its furface. The menftruums ufed to ftrike in the colours muft be varied according to the nature of the colour to be ufed. A lixivium made with horfe's or dog's urine, with four parts quick-lime, and one part pot-afhes, is excellent for fome colours; common ley of wood-afhes does very well for others; for fome, fpirit of wine is beft; and finally, for others, oily liquors, or common white wine.

The colours which have been found to fucceed beft with the peculiar menftruums are thefe: ftone-blue diffolved in fix times the quantity of fpirit of wine, or of the urinous lixivium; and that colour which the painters call litmus, diffolved in common ley of wood-afhes. An extract of faffron, and that colour made of buckthorn berries, and called by the painters fap-green, both fucceed, well diffolved in urine and quick-lime, and tolerably well in fpirit of wine. Vermilion, and a fine powder of cochineal, fucceed alfo very well in the fame liquors. Dragon's blood fucceeds very well in fpirit of wine, as does alfo a tincture of logwood in the fame fpirit. Alkanet-root gives a fine colour, but the only menftruum to be ufed for this is oil of turpentine; for neither

neither spirit of wine, nor any lixivium, will do with it. There is another kind of *sanguis draconis*, called dragon's blood in tears, which, mixed with urine alone, gives a very elegant colour. Phil. Transf. N° 268, or Abridg. vol. iv. part ii p. 205.

Beside these mixtures of colours and menstruums, there are some colours which are to be laid on dry and unmixed. These are dragon's blood of the purest kind, for a red; gamboge for a yellow; green wax for a green; common brimstone, pitch, and turpentine, for a brown colour. The marble for these experiments must be made considerably hot, and then the colours are to be rubbed on dry in the lump. Some of these colours, when once given, remain immutable; others are easily changed or destroyed. Thus the red colour given by dragon's blood, or by a decoction of logwood, will be wholly taken away by oil of tartar, and the polish of the marble not hurt by it.

A fine gold colour is given in the following manner: take crude sal ammoniac, vitriol, and verdigris, of each equal quantities: white vitriol succeeds best, and all must be thoroughly mixed in fine powder.

The staining of marble to all the degrees of red, or yellow, by solutions of dragon's blood or gamboge, may be done by reducing these gums to powder, and grinding them with the spirit of wine, in a glass mortar; but for smaller attempts, no method is so good as the mixing of a little of either of these powders with spirit of wine, in a silver spoon, and holding it over burning charcoal. By this means a fine tincture will be extracted, and with a pencil dipped in this, the finest traces may be made on the marble, while cold, which, on the heating of it afterwards, either on sand, or in a baker's oven, will all sink very deep, and remain perfectly distinct in the stone. It is very easy to make the ground-colour of the marble red or yellow by this means, and leave white veins in it. This is to be done by covering the places where the whiteness is to remain with some white paint, or even with two or three doubles only of paper, either of which will prevent the colour from penetrating in that part. All the degrees of red are to be given to marble by means of this gum alone; a slight tincture of it, without the assistance of heat to the marble, gives only a pale flesh-colour; but the stronger tinctures give it yet deeper; to this the assistance of heat adds yet greatly; and finally, the addition of a little pitch to the tincture gives it a tendency to blackness, or any degree of deep red that is desired.

A blue colour may be given also to marble by dissolving turnsol in a lixivium of lime and urine, or in the volatile spirit of urine; but this has always a tendency to purple, whether made by the one or the other of these ways. A better blue, and used in an easier manner, is furnished by the Canary turnsol, a substance well known among the dyers. This needs only to be dissolved in water, and drawn on the place with a pencil: this penetrates very deep into the marble, and the colour may be increased by drawing the pencil, wetted afresh, several times over the same lines. This colour is subject to spread and diffuse itself irregularly; but it may be kept in regular bounds, by circumscribing its lines with beds of wax, or any other such substance. It is to be observed, that this colour should always be laid on cold, and no heat given even afterwards to the marble; and one great advantage of this colour is, that it is therefore easily added to marbles already stained with any other colours, and it is a very beautiful tinge, and lasts a long time. Mem. Acad. Par. 1732.

This art has in several people's hands been a very lucrative secret, though there is scarcely any thing in it that has not at one time or other been published.

Kircher has the honour of being one of the first who published any thing practicable about it. This author meeting with stones in some cabinets supposed to be natural, but having figures too nice and particular to be supposed to be nature's making, and these not only on the surface, but sunk through the whole body of the stones, was at the pains of finding out the artist who did the business; and on his refusing to part with the secret on any terms, this author, with Albert Gunter, a Saxon, endeavoured to find it out; in which they succeeded at length very well. Their method is this: take aqua fortis and aqua regia of each one ounce, sal-ammoniac one ounce, spirit of wine two drachms, about twenty-six grains of gold, and two drachms of pure silver; let the silver be calcined and put into a phial, and pour upon it the aqua fortis; let this stand some time, then evaporate it, and the remainder will first appear of a blue, and afterwards of a black colour; then put the gold into another phial, pour the aqua regia upon it, and when it is dissolved, evaporate it as the former; then put the spirit of wine upon the sal-ammoniac, and let it be evaporated in the same manner. All the remainders, and many others made in the same manner from other metals dissolved in their proper acid menstrua, are to be kept separate and used with a pencil on the marble. These will penetrate without the least assistance of heat, and the figure being traced with a pencil on the marble, the several parts are to be touched over with the proper colours, and this renewed daily till the colours have penetrated to the desired depth into the stone. After this the mass may be cut into thin plates, and every one of them will have the figure exactly represented on both surfaces, the colours never spreading. The nicest method of applying these, or the other tinging substances, to marble that is to be wrought into any ornamental works, and where the back is not exposed to view, is to apply the colours behind, and renew them so often till the figure is sufficiently seen through the surface on the front, though it does not quite extend to it. This is the method that of all others brings the stone to a nearer resemblance of natural veins of this kind. The same author gives another method to colour marble by vitriol, bitumen, &c. forming a design of what you like upon paper, and laying the said design between two pieces of polished marble; then closing all the interstices with wax, you bury them for a month or two in a damp place. On taking them up, you will find that the design you painted on the paper has penetrated the marbles, and formed exactly the same design on them. Kircher's Mund. Subter. lib. viii. § 1. cap. 9.

Wallerius, in his Mineralogy, vol. ii. p. 128. recommends the last method of Kircher; and the first method is copied in the Phil. Transf., N° 7.

The art was practised by Mr. Bird, a stone-cutter at Oxford, before the year 1666; but his method is not recorded. Mr. Robert Chambers, of Minching Hampton, in Gloucestershire, discovered and practised a method of colouring marble, which he kept a secret. Mr. Da Costa has published an account of experiments made on several pieces of marble stained by this artist. Phil. Transf. vol. li. art. 5. p. 30, &c.

Spots of oil stain white marble, so that they cannot be taken out. See Staining *of Stones*.

Marble, *Polishing of.* The art of cutting and polishing marble was, of course, known to the ancients, whose mode of proceeding appears to have been nearly the same with that employed at present; except, perhaps, that they were unacquainted with those superior mechanical means which now greatly facilitate the labour, and diminish the expence of the articles thus produced. There are many celebrated manufactories

factories of this kind generally called marble mills, on the continent, and also in Great Britain; but as the principle on which they proceed is nearly the same in all, it will suffice in this place to give the description of one or two of the latter. The following description, together with some preliminary observations, communicated by a person practically acquainted with this subject, relate to the manufactory of Messrs. Brown and Mawe at Derby.

An essential part of the art of polishing marble is the choice of substances by which the prominent parts are to be removed. The first substance should be the sharpest sand, so as to cut as fast as possible, and this is to be used till the surface becomes perfectly flat. After this the surface is rubbed with a finer sand, and frequently with a third. The next substance after the finest sand is emery of different degrees of fineness. This is followed by the red powder called tripoli, which owes its cutting quality to the oxyd of iron it contains. Common iron-stone powdered and levigated answers the purpose very well. This last substance gives a tolerably fine polish. This, however, is not deemed sufficient. The last polish is given with putty. After the first process, which merely takes away the inequalities of the surface, the sand employed for preparing it for the emery should be chosen of uniform quality. If it abounds with some particles harder than the rest, the surface will be liable to be scratched so deep as not to be removed by the emery. In order to get the sand of uniform quality, it should be levigated and washed. The hard particles, being generally of a different specific gravity to the rest, may by this means be separated. This method will be found much superior to that of sifting. The substance by which the sand is rubbed upon the marble is generally an iron plate, especially for the first process. A plate of an alloy of lead and tin is better for the succeeding processes, with the fine sand and emery. The rubbers used for the polishing, or last process, consists of coarse linen cloths, such as hop bagging, wedged tight into an iron plane. In all these processes, a constant supply of small quantities of water is absolutely necessary.

The sawing of marble is performed on the same principles as the first process of polishing. The saw is of soft iron, and is continually supplied with water and the sharpest sand. The sawing, as well as the polishing of small pieces, is performed by hand. The large articles, such as chimney-pieces and large slabs, are manufactured by means of machinery working by water or steam. We shall next give a description of this branch of manufacture in the large way, as carried on by Brown and Mawe at Derby, and in London, N° 149 Strand, who have justly attained great celebrity as workers of spar and marble into different ornaments.

Fig. 1. *Plate* XXIII. *Miscellany*, is a side view of a mill for sawing and polishing slabs of marble; *fig.* 2. being a ground plan of the same, and marked with corresponding letters. A B C is a frame of wood, suspended by the upright frames of wood, D, E, F, G, from the beams H, H, H, H, so as to be capable of an oscillatory motion. Motion is given to this frame by the rod I communicating with the crank O K, which is turned by water or steam.

This frame, being put in motion, gives motion to the saw frames L, L, M, M, and to the polishing arms N, P, Q, which work on the pivot P, and are pushed backwards and forwards by the connecting iron rods *n*, *n*. The saws are iron plates shaped like a common saw, and fastened into oblong rings by means of pins. These rings are put upon the cross bars E, E, *b*, *b*, and the saws are stretched tight by the screws *s*, *s*, *s*, and C. R, R, S, S, are four upright posts constituting a frame, in which are placed the blocks of marble to be sawn into slabs, which are at the same time to guide the frame of the saw. At each end of this frame there are a number of upright square bars of iron *i*, *i*, between which the saws pass which bars, act as conductors. The posts R, R, can be removed to a greater distance, so as to make the frame longer for receiving different sized blocks. The part T, to which the saw is attached on the moveable frame, slides upon the upright post A C. It is suspended by a rope, which goes over a pulley *c*, and is counterbalanced by the weight W. By this means the saw may be made to press upon its work with any degree of force. It will be evident that the moveable frame, from its pendulous motion, does not move in a straight line, but a curve. The sliding part T, therefore, serves to induce a rectilineal motion of the saw. The upright bars of iron *i*, *i*, and C, are of a size equal to or less than the thinnest slabs, so that the saws may be placed at different distances, according to the thickness of the slabs. In order to alter the saws for this purpose, nothing more is necessary than to loosen the screws *s*, *s*, &c. and shift the oblong rings which contain the saws.

The slabs of marble to be polished are laid upon the carriage *h*, so as to correspond with the rubber Q, which passes over it in the direction of its length. In order to extend the rubber to the other parts of the slab, the carriage, *h*, has a lateral motion, by means of four grooved wheels running upon the iron guiders let into the beams *g*. *g*. The endless screw *e*, in the main shaft, turns the wheel *r*. This gives motion to the lever *w*, *fig*. 2, by means of the crank *q*. The lever communicates with the crank *k*, and turns the wheel *l*, more or less of a revolution, according to the length of this crank, which can be altered at pleasure by shifting the temporary pin *e*. By this latter motion the wheel, *k*, works the ratch *v*, and gives the lateral motion to the carriage. By this means the whole of the surface is exposed to the action of the rubber. Round articles of spar, gypsum, and marble, are turned in the lathe with pointed instruments of hardened steel. The pieces to be turned are attached to a wooden chock by means of cement. The gypsum is very soft, and turns with great facility. The fluor spar and marble require the tool to be very hard, while the part to be turned requires a constant supply of water, which drops from a vessel above. After the articles are turned into the given shape, they are dressed with sand and emery, and afterwards polished with tripoli and putty.

Small specimens for collections of marbles are generally polished upon a lap, which runs in a lathe. These laps, however, ought to run with the axis perpendicular to the horizon, the face of the lap being truly flat and horizontal. The lap used for the first process should be of iron; the second of an alloy of lead and tin; and the third, which is for polishing, should be of iron with pitch. By means of some auxiliary machinery, a number of pieces might be polished in this way at once, which would save much manual labour. Small pieces of marble may also be polished on the large machine, by cementing them with plaster on the surface of a large slab. By being placed on the same level, the large rubber sweeps them all at once.

The marble mill in the neighbourhood of Kilkenny, in Ireland, mentioned under the article IRISH MARBLES, *supra*, and which was invented by alderman Collis, grandfather of the present proprietor, is remarkable for the simplicity of its structure, and for the powers it exerts. One wheel, ten feet diameter, with twelve floats or ladles, gives motion, by a crank at one end of its axis, to a frame containing twelve saws, which do the work of about twenty men. By a

crank

crank at the other end, it moves a frame of five polifhers, which do the work of about ten men. At this end Mr. Collis has lately fitted a frame beneath the polifhers, with eight faws, to the motion of which he has found the power of the machine fully equal. This mill may be fairly faid to do the conftant work of forty-two men daily. During the night the mill ftopped, a conftant attention being required to fupply the faws with fand, and to attend the polifhers. The faws are made of foft iron, and laft about a week; they are conftantly fupplied with water and fand; the latter is taken out of the bed of the Nore, and wafhed till nothing remains, but very fine and pure filiceous particles. A faw cuts ten inches in a day, and twelve when the water is ftrong; it would require two men to do the fame with a hand faw. The marble taken from the mill is firft polifhed with a *cove-ftone*, that is, a brown fand-ftone imported from Chefter, and which takes its name from being ufed in chimney coves. It is afterwards polifhed by a *hone-ftone*, which is a piece of fmooth nodule of the argillaceous iron ore, found in the hills between Kilkenny and Frefhford. It receives the laft polifh in the mill with rags and putty. By means of this mill, the marble is fo eafily worked as to be fold at a very moderate price.

A great improvement in cutting marble and other ftones, but particularly columns by machinery, was invented in Ireland by the late fir George Wright, bart., who procured a patent for it. By this a number of hollow columns can be cut from a folid block, each decreafing in fize, fo that nothing of the ftone is loft, except what is converted into duft by the faw.

MARBLE *Harbour*, in *Geography*, a bay in the Mergui Archipelago, on the E. coaft of Sullivan's ifland. N. lat. 10° 58'.

MARBLE *Ifland*, a fmall ifland of the Mergui Archipelago, at the entrance of Marble harbour.—Alfo, an ifland in Hudfon's bay. N. lat. 62° 35'. W. long. 91° 30'.

MARBLED, fomething veined, or clouded, refembling marble. Marbled paper is a paper ftained with various clouds and fhades, refembling, in fome meafure, the divers veins of marbles; the method of making which, fee under PAPER.

MARBLED *China-ware*, a name given by many to a fpecies of porcelain or China-ware, which feems to be full of cemented flaws. It is called by the Chinefe, who are very fond of it, *tfou-tchi*.

It is generally plain white, fometimes blue, and has exactly the appearance of a piece of China which had been firft broken, and then had all the pieces cemented in their places again, and covered with the original varnifh. The manner of preparing it is eafy, and might be imitated with us. Inftead of the common varnifh of the china-ware, which is made of what they call oil of ftone and oil of fern mixed together, they cover this with a fimple thing made only of a fort of coarfe agates, calcined to a white powder, and feparated from the groffer parts by means of water, after long grinding in mortars. When the powder has been thus prepared, it is left moift, or in form of a fort of cream, with the laft water that is fuffered to remain in it, and this is ufed as the varnifh. Our cryftal would ferve full as well as thefe coarfe agates, and the method of preparation is perfectly eafy. Obferv. fur les Coût. de l'Afie.

The occafion of the fingular appearance of this fort of porcelain is, that the varnifh never fpreads evenly, but runs into ridges and veins. Thefe often run naturally into a fort of mofaic-work, which can fcarcely be taken for the effect of chance. If the marbled China be defired blue, they firft give it a general coat of this colour, by dipping the veffel into a blue varnifh; and when this is thoroughly dry, they add another coat of this agate-oil.

MARBLEHEAD, in *Geography*, a port of entry, and poft-town of America, in Effex county, Maffachufetts, containing one epifcopal, and two congregational churches, and 5211 inhabitants. The harbour lies in front of the town S.E. extending from S.W. to N.E., about a mile and a half in length, and half a mile broad. A battery and citadel were erected here in 1795, for the defence of the place, by order of Congrefs. The bank-fifhery employs the principal attention of the inhabitants, and more of this bufinefs is done here than in any other place in the ftate. The exports of the year 1794 amouted to 184,532 dollars. Marblehead was incorporated in 1649, and lies 4 miles S.E. of Salem, and 19 N.E. of Bofton. N. lat. 42° 30'. W. long. 69° 49'.

MARBLES, PLAYING, are moftly imported from Holland, where it is faid they are made by breaking the ftone alabafter, or other fubftance, into pieces, or chips of a fuitable fize; thefe are put into an iron mill which turns by water: there are feveral partitions with rafps within, cut floatways, not with teeth, which turn conftantly round with great fwiftnefs; the friction againft the rafps makes them round, and as they are formed they fall out of different holes, into which fize or chance throws them. They are brought from Nuremberg to Rotterdam, down the Rhine, and from thence difperfed over Europe.

MARBLETOWN, in *Geography*, a townfhip in Ulfter county, New York, on the W. fide of Hudfon river, N.W. of Pultz, adjoining. It contains 2847 inhabitants.

MARBLING, the art or act of painting or difpofing colours in fuch a manner, that they may reprefent marble. Thus we marble books, paper, wood, &c. See PAPER, and *Colouring, &c. of* BONE.

MARBLING *of Books*, among *Binders*, denotes the fprinkling over the cover of a book firft with ink, and afterwards with weak aquafortis. See BOOK-*binding*.

They alfo marble books on the edges; but, in this marbling, there is no black ufed, but, in lieu thereof, red, blue, &c.

MARBŒUF, in *Geography*, a town of France, in the department of the Eure; 12 miles N. of Conches.

MARBOS, a town of France, in the department of the Ain; 8 miles N. of Bourg-en-Breffe.

MARBURG, a town of the duchy of Stiria, feated on the Drave, which had formerly counts of its own; 31 miles S. of Gratz. N. lat. 46° 40'. E. long. 15° 37'.

MARBURG, or *Marpurg*, a town and capital of Upper Heffe, on the W. fide of the Lahn, defended by a caftle, in which the landgraves of Heffe formerly refided. This town has an univerfity, founded in 1527 by the landgrave Philip the Magnanimous, alfo an academy for claffical literature, and three Proteftant churches. About the beginning of the thirteenth century, this place was raifed from a village to a town. In 1261 and 1319 it was wholly deftroyed by fire. In 1759 it was garrifoned by French troops, who were foon after obliged to furrender themfelves prifoners of war; 36 miles N. of Francfort-on-the-Maine. N. lat. 50° 48'. E. long. 8° 48'.

MARC, in *Biography*. See MARCOSIANS.

MARCA, PETER DE, a celebrated French prelate, was born at Gant, in the principality of Bearn, in the year 1594. Having laid a good foundation in claffical learning and polite literature, he went through a courfe of philofophy under the Jefuits at Touloufe: after this he ftudied the law, and at the age of twenty-two was nominated by Lewis XIII. counfellor in in the ſovereign council of Pau, in which, though he was the only Catholic in that court, he conducted himſelf with ſo much prudence, that he maintained perfect harmony with all his coadjutors, and was ſucceſsful in bringing back ſeveral of the reformed into the boſom of the Catholic church. In the midſt of other important engagements, he devoted much of his time to the ſtudy of theology and eccleſiaſtical antiquities. In 1639 he was called to Paris, and was honoured with the rank and dignity of counſellor of ſtate. In the following year he publiſhed his "Hiſtory of Bearn," which tended greatly to confirm the reputation that he had already acquired for learning and abilities. About this time M. Herſent publiſhed an artful defence of the Papal pretenſions over the Gallican church, in the form of a ſatire on the policy of cardinal Richelieu, which, it pretended, aimed at the ſeparation between the churches of Rome and France, ſimilar to the ſchiſm produced by Henry VIII. in England; and the erection of a patriarchate in France in the perſon of the cardinal. To counteract the effects of this work, Richelieu employed the pen of M. de Marca, who, in 1641, publiſhed a piece entitled "De Concordia Sacerdotii et Imperii, ſive, de Libertatibus Eccleſiæ Gallicæ." This was a very learned, and generally eſteemed excellent, vindication of the rights and liberties of the French church and ſtate, and it was received with great applauſe by thoſe Catholics, who, though ſteadily attached to the doctrines of the church of Rome, reſiſted the tyranny and injuſtice of its aſpiring pontiffs: but in the court of Rome it excited much indignation againſt the author, of which he ſoon felt the effects. The king appointed him to a biſhopric, which the cardinals, by certain manœuvres, prevented him from entering upon, till he had retracted or explained away every ſentiment that had given offence at Rome, and by declaring his unreſerved ſubmiſſion of what he had written, or might in future write, to the ſovereign judgment of the holy apoſtolic ſee. Having by this ſervile conduct appeaſed the reſentment of the papal court, he was ordained prieſt, and immediately afterwards conſecrated biſhop. This was in the year 1648, and in 1652, as a reward for other ſervices, he was nominated archbiſhop of Toulouſe, but, by a new oppoſition from the court of Rome, he was not tranſlated till the year 1655. In 1658 he was made a miniſter of ſtate, and followed the king to Lyons, after which he was appointed to preſide over the ſtates of Narbonne, upon the death of the archbiſhop. After Cardi al Mazarin had concluded a peace, he was ſent to Rouſſillon for the purpoſe of determining, with the commiſſioners of the king of Spain, the preciſe limits between France and Spain, according to the boundary line of the ancient geographers. Upon the death of the cardinal, in 1661, Marca was ſelected as one of the perſons to preſide over eccleſiaſtical affairs, and in the following year he was, in conſequence of the reſignation of cardinal de Retz, nominated to that dignity, but he did not live to enjoy, or even to take poſſeſſion of this high office. He died about the ſixty-eighth year of his age: he was a man of profound erudition, of a fine underſtanding, and of an extraordinary genius for buſineſs. He was a great politician, a good lawyer, a learned divine, and an able critic. He never ſcrupled to make his principles give way, if by ſo doing he could promote his own intereſts. A few months before his death he dictated to his ſecretary "A Treatiſe on the Infallibility of the Pope," with the expreſs view of recommending himſelf to a cardinal's hat. The beſt edition of his celebrated work "De Concordia" was publiſhed after his death, in 1704, in which the conceſſions with which he had purchaſed the papal bull to obtain the prelacy, were, by his order, directed to be omitted, and the work given in its original ſtate. He was author of ſeveral other pieces, among which were "Marca Hiſpanica," containing a curious and valuable geographical and hiſtorical deſcription of Catalonia, Rouſſillon, and the neighbouring countries: "An Account of what paſſed in the Aſſemblies of the Biſhops in 1653:" "Theological Treatiſes;" and two volumes of "Opuſcula." Moreri.

MARCANTHUS, in *Botany*, is a genus of Loureiro's, ſo called by an unaccountable, though we preſume accidental, miſtake for *Macranthus*, ſince the derivation of its name being avowedly from μακρος, *long*, (which he erroneouſly writes μαρκος,) and ανθος, *a flower*; the genus being very remarkable for the great length of its flowers. Loureir. Cochinch. 460.—Claſs and order, *Diadelphia Decandria*. Nat. Ord. *Papilionaceæ*, Linn. *Leguminoſæ*, Juſſ.

Gen. Ch. *Cal.* Perianth inferior, tubular, coloured, downy, permanent, cloven into four, acute ſegments, the two lateral ones ſhorter. *Cor.* papilionaceous, very long, almoſt cloſed. Standard ovate, emarginate, connivent, longer than the calyx. Wings oblong, erect, thrice as long as the ſtandard. Keel longer than the wings, with an acute, aſcending point. *Stam.* Filaments ten, ſimple and nine-cleft, all linear-turbinate, acuminated and ſtraight, four of them three times as thick as the reſt; anthers of the thicker ones ovate, incumbent; of the others oblong and upright. *Piſt.* Germen ſuperior, oblong, cylindrical; ſtyle thread-ſhaped, hairy all over, the length of the ſtamens; ſtigma obtuſe, roughiſh. *Peric.* Legume ſtraight, nearly cylindrical, thick, pointed. *Seeds* numerous, nearly ovate.

Eſſ. Ch. Keel and wings very long. Legume thick, ſomewhat cylindrical.

1. M. *cochinchinenſis*. Loureir. Dâu meò, of the natives.—A native of cultivated ground in Cochinchina.—The *ſtem* is herbaceous, long, round, twining, branched. *Leaves* ternate, ovate-rhomboid, hairy. *Stipulas* thread-ſhaped. *Flowers* white, with a calyx of the ſame colour, on many-flowered, axillary ſtalks. *Legume* eſculent, although neither well taſted nor ſalubrious.

MARCAPATA, in *Geography*, a town of Peru, in the juriſdiction of Quiſnicanchi.

MARCARIA, a town of Italy, in the department of the Mincio, on the Oglio; 14 miles S.W. of Mantua.

MARCASI, three ſmall iſlands in the Pacific ocean, near the coaſt of Peru. S. lat. 11° 30′.

MARCASITE, in *Mineralogy*, *Arſenical Pyrites* of Kirwan. See Arsenic.

MARCAY, in *Geography*, a town of France, in the department of the Vienne; 7 miles S. of Poitiers.

MARCEL, St., a town of France, in the department of the Ardèche; 24 miles S. of Privas.—Alſo, a town of France, in the department of the Mouths of the Rhône; 5 miles E. of Marſeilles.—Alſo, a town of New Navarre; 130 miles S.W. of Caſa Grande.

MARCELLIANISM, in *Eccleſiaſtical Hiſtory*, the doctrines and opinions of the Marcellians, a ſect of ancient heretics, towards the commencement of the third century, ſo called from Marcellus of Ancyra, their leader, who was accuſed of reviving the errors of Sabellius.

It is generally ſuppoſed that Marcellus, biſhop of Ancyra, in Galatia, was preſent at a council of Ancyra in 314, as biſhop of that city. He was alſo at the council of Nice in 325, where he ſignalized himſelf againſt the Arians; and it is concluded, from the teſtimony of Epiphanius, that he died in 372, when he had been biſhop almoſt 60 years, and had lived almoſt or quite a century. Socrates ſays, that in oppoſing Aſterius, againſt whom and other Arians he wrote a book a book in the year 334 or 335, Marcellus went into the other extreme, and embraced the opinion of Paul of Samofata, who fays, that Jefus Chrift is a mere man. He was depofed by an affembly of bifhops at Conftantinople, in 336, but reftored by the fynod at Sardica in 347. His book, which was a large work, and the only one he had publifhed, was anfwered by Eufebius of Cæfarea, from whofe quotations and arguments, as well as from Marcellus's letter and confeffion of faith, delivered to Julius, bifhop of Rome, about the year 341, which is preferved by Epiphanius, that he received the fame fcriptures with other Chriftians, and paid them a like refpect. Socrates and Sozomen feem to have fuppofed, that he adopted the opinion of Paul of Samofata; but Eufebius continually charges him with Sabellianifm. Theodoret fays, that he denied a trinity of perfons. However, there have been formerly, as well as lately, different apprehenfions concerning the real fentiments of Marcellus; but, according to Dr. Lardner, there is fufficient reafon to think, that he was a Sabellian or Unitarian. Montfaucon is of opinion, that not long before his death, about the year 372, he fent a deputation to Athanafius, with a confeffion of his faith, completely orthodox; but this ftory, as Dr. Lardner thinks, is not well fupported. If the doctrine of Marcellus be carefully examined, it will appear, fays Mofheim, that he confidered the Son and Holy Ghoft as two emanations from the divine nature, which, after performing their refpective offices, were to return again into the fubftance of the Father; and every one will perceive, at firft fight, how incompatible this opinion is with the belief of three diftinct perfons in the Godhead. Lardner's Works, vol. iv. Mofheim's Eccl. Hift. vol. i.

MARCELLIN, St., in *Geography*, a town of France, and principal place of a diftrict, in the department of the Ifére; 30 miles S.E. of Vienne. The place contains 3047, and the canton 14,589 inhabitants, on a territory of 240 kiliometres, in 16 communes.—Alfo, a town of France, in the department of the Rhône and Loire; 9 miles S.S.E. of Montbrifon.

MARCELLINO, a town of Naples, in Calabria Citra; five miles E. of Scalea.

MARCELLINUS, Ammianus, in *Biography*. See Ammianus Marcellinus.

Marcellinus, pope, a native of Rome, fucceeded to the fee of that city in the year 296. He was accufed by the Donatifts of having apoftatized under the Dioclefian perfecution; of having given up the fcriptures to be burnt by the Pagans; and of offering incenfe even to the gods. It fhould, however, be obferved, that the innocence of Marcellinus was defended, and his conduct juftified by St. Auguftine and Theodoret, who affirm that he acquired great glory during the perfecution. He prefided over the Roman church fomething more than eight years, and died in the year 304. Moreri.

Marcellinus, count of Illyria under the emperor Juftinian, drew up a chronicle, commencing at the point in which Jerome finifhes, and carrying it down to the year 534. It is much applauded by Caffiodorus, who fays that the count alfo compofed a very minute defcription of Conftantinople and Jerufalem. The chronicle has been feveral times printed, firft by Schoonhovius, in the fixteenth century: then by Jofeph Scaliger, and ftill more correctly by father Sirmond. Moreri.

MARCELLO, Benedetto, a Venetian nobleman, defcended from one of the moft illuftrious families of that republic; he had cultivated mufic fo ferioufly and fuccefsfully as a dilettante in the art, under the guidance of the celebrated Venetian maeftro di capella, Gafparini, that no contemporary profeffor was more reverenced for mufical fcience, or half fo much praifed for his abilities as a compofer, as Marcello. This accomplifhed nobleman, befides his mufical productions, confifting of pfalms, operas, madrigals, fongs, and cantatas, was frequently his own poet, and fometimes affumed the character of lyric bard for other muficians. It is probable that Marcello had received fome difguft in his early attempts at dramatic mufic; for, in 1720, he publifhed a furious fatire upon compofers, finging-mafters, and fingers in general, under the title of "Teatro alla Moda," or "An eafy and certain Method of compofing and performing Italian Operas in the modern Manner." But his great mufical work, to which the late Mr. Avifon's encomiums and Mr. Garth's publication to Englifh words, have given celebrity in our own country, was firft printed at Venice in eight volumes folio, under the following title: "Eftro poetico-armonico, Parafrafi fopra i primi 50 Salmi, Poefia di Girolamo Afcanio Giuftiniani, Mufica di Benedetto Marcello, Patrizj Veneti, 1724 & 1725." There is a long and learned preface to the firft volume, in order to give weight and authority to the author's plan and ftyle of compofition. But befides the great difplay of mufical reading, fagacity, and fuperior views to any of his predeceffors, letters are prefixed to each volume from the author's friends and admirers, in the fame encomiaftic ftrain as the recommendatory verfes, with which almoft every book was ufhered into the world during the feventeenth century. But not dazzled by thefe, or the hyperbolical praifes of Algarotti or Avifon, we have confcientioufly examined the whole eight volumes of the Italian edition, and find, though there is confiderable merit in the work, that the author has been *over-praifed*: as the fubjects of many of his fugues and airs are not only common and old-fafhioned at prefent, but were far from new at the time thefe pfalms were compofed. But Marcello was a Venetian nobleman, as Venofa was a Neapolitan prince; both did honour to mufic by cultivating it; but both expected and received a greater return in fame, than the legal intereft of the art would allow. Marcello was a difciple of Gafparini, and died in 1741.

We found ftill fubfifting at Venice, a fociety for the performance of Marcello's compofitions exclufively, and were invited to one of its meetings. Several of Marcello's pfalms were here very well fung by the Abate Martini and fome other dilettanti, among whom one had a very good bafe voice, and between the pfalms, fung Marcello's famous cantata, called Caffandra, where this compofer has entirely facrificed the mufic to the poetry, by changing the time or ftyle of his movement at every new idea which occurs in the words; this may, perhaps, fhew a compofer to be a very fenfible man, but at the fame time it muft difcover him to be of a very phlegmatic turn, and wholly free from the enthufiafm of a creative mufical genius. And, indeed, fince melody has been allied to grace and fancy, mufical disjointed thoughts on various fubjects would be but ill received by the public. One of thefe gentlemen performers was old enough very well to remember Benedetto Marcello, and favoured us with feveral anecdotes concerning him and his family which ftill fubfifted, and the head of it then was ambaffador from the ftate to the Porte.

Marcello was not only his own poet in dramas which he fet to mufic, but fometimes furnifhed words to other mufical compofers. He was author of a drama called "Arato in Sparta," which was fet by Ruggieri, and performed at Venice in 1704; and in 1710 he produced both the words and the mufic of an oratorio, called "Giuditta." He fet the

"Psyche" of Cassini, about the same time. In 1718, he Published sonnets of his own writing, without music: and in 1725 he both wrote and set a serenata, which was performed at the imperial court of Vienna.

To some of his madrigals and cantatas, of which we prefer the composition to that of many of his psalms, we were told at Venice that he was his own poet.

But we have lately been favoured with a complete score of an oratorio by Marcello, of which we had never before heard of the existence. Its title, which is somewhat long, and its subject singular for an oratorio, is the following:

"Il Trionfo della Poesia, e della Musica, nil celebrarsi la Morte, la Esaltazione, e la Incoronazione, di Maria sempre Vergine assunto in cielo, Oratorio sagro a 6 voci 1733. Musica e Poesia di Benedetto Marcello."

The interlocutors are Poetry, Music, Painting, Sculpture, and chorus of Poets, Liberal Arts, and Old Musicians.

But these personifications are not so wide from sacred subjects as Alexander's Feast, and Semele, which are indeed sacred subjects of Paganism. And though the subject of this drama may be too playful, and the airs too gay for an oratorio, yet it is amusing to see how a great man may amuse himself in trying to amuse others. The airs are much superior to those of the noble author's psalms, and more ingeniously accompanied.

The overture, which begins with a spirited movement, ends with an admirable fugue in double counterpoint, instead of an air. There are ingenious airs and duets in echo, in the first part, and the coro finale is an alla-breve fugue on the hexachords.

In the second part there are many curious airs, duets, and chorusses, well accompanied; and all in clear and good counterpoint, and though it is called an oratorio, the movements are as gay and cheerful as any secular music of the same period. It must be owned that the chorusses and accompaniments of Handel's oratorios have made the English fastidious about sacred music. But Marcello must ever be admired for Italian grace and smoothness, and Handel for German force and vigour.

Marcello, *St.*, in *Geography*, a town of France, in the department of the Dora; 5 miles S.E. of Aosta.

MARCELLUS, surnamed Empiricus, *the Empiric*, in *Biography*, was a native of Bourdeaux, and held an appointment under the emperors Theodosius and Arcadius. He died in the reign of Theodosius, the younger, who ascended the throne of the eastern empire in the year 408. It does not appear that Marcellus pursued the study of medicine as a profession, but took it up as an amateur, without acquiring any profound skill in it. He compiled from authors, both ancient and contemporary, and especially from Scribonius Largus, whom he copies literally without acknowledgment, and also from popular report, a collection of medicines and receipts for all the diseases of the body; in which, however, his superstition is more conspicuous than his judgment. Nevertheless his work has been preserved, and printed under the title of "De Medicamentis empiricis physicis et rationalibus Liber à Jano Cornario versus," Basil, 1536, &c. and was included among the "Medicæ Artis Principes," collected by Henry Stephen. Marcellus dedicated this compilation to his children, in an epistle which is preserved, with a view of teaching them the means of relieving their diseases by simple remedies; but at the same time he counsels them not to neglect the more compound ones when necessary, and to consult the most expert physicians before they employ them. Eloy Dict. Hist.

Marcellus Donatus, a physician of the sixteenth century, quitted the practice of his profession, and became secretary to the duke of Mantua. He is known as the author of a compilation of medical cases and observations, collected from the Greek, Arabian, and later writers, who had preceded him. This work was first published at Mantua, in 1586, quarto, and afterwards at Venice, 1588, and 1597, in six books, with the title of "De Historiâ Medicâ Mirabili Lib. VI." Horstius afterwards republished it at Franckfort, in octavo, in 1613, with a seventh book, on diseases reputed magical, and on extraordinary abstinence. Marcellus was also author of a tract, "De Variolis and Morbillis," printed at Mantua in 1569, quarto, and 1597, octavo, with another tract, "De Radicé purgante, quam vocant Mekoakan." Eloy, loc. cit.

Marcellus, Marcus Claudius, a celebrated Roman general, descended from a plebeian, but an ancient and consular family, entered early into the military service of his country, and obtained many honorary rewards for his valour and heroism. He was elected consul with Cn. Cornelius Scipio in the year 222 B.C. They were, immediately after their election, obliged to take the field against the enemies of the republic; and Marcellus was singled out by Viridomarus, king of the Gæsatæ, for single combat. The consul soon destroyed his enemy, and consecrated his spoils to Jupiter Feretrius, which being reckoned propitious to his designs, he attacked the enemy, and gained a complete victory. On account of this success, a triumph was decreed to Marcellus, of which the noblest ornaments were the *opime* spoils, that is, those taken from a slain king. The greatness of this distinction may be inferred from the lines which are referred to him in Virgil's prospective view of the Trojan progeny:

"Aspice ut insignis spoliis Marcellus opimis
Ingreditur, victorque viros supereminet omnes."
Æneid vi.

In the second Carthaginian war, Marcellus was appointed prætor of Sicily, and had got ready a fleet for that service, when the event of the fatal battle of Cannæ induced the senate to send him to take command of those who survived that disaster. He threw himself into Nola, which was threatened by Hannibal with a siege, and gave that commander a considerable check, which revived the courage of the Romans, and saved the place. In the year B.C. 215, Marcellus was again unanimously chosen consul, but a thunder-storm happening at the time of assembly, it was thought the election was displeasing to the gods, and he refused to accept the office, though pressed to it by the people. Fabius Maximus was elected in his stead, and Marcellus was continued in a proconsular command over the troops at Nola. After this he was chosen consul in connection with Fabius Maximus, and thus it was said, Rome was defended at the same time by her *sword* and her *shield*, which were the epithets applied to these two great commanders. Marcellus was now called to active exertions in Sicily, in which island the Carthaginian interest was very prevalent; he invested Syracuse, the capital, then one of the richest and strongest cities in this part of the world. He first proposed terms of accommodation, which being rejected, he laid siege to the city by land and by sea, taking command of the Roman fleet upon himself, while the prætor Appius commanded the land forces. This siege was rendered very remarkable by the various mechanical contrivances of the great Archimedes for its defence. By their means, the first attempts of the Romans were defeated with great loss: and Marcellus, converting the siege into a blockade, led the greater part of his troops against the revolted cities of Sicily, many of which he reduced to obedience.

dience. After his confulfhip was expired, he was continued as proconful in the chief command in Sicily, and bent every effort to the finifhing a fiege upon which the eyes of all parties were attentively fixed. Marcellus determined on making an affault upon Syracufe, and fixed on the enfuing feftival of Diana for this purpofe, in which it was imagined the garrifon would probably be buried in wine and fleep. At the appointed time a choice band of troops fcaled the walls without difcovery, and certain quarters of the city were taken without refiftance Marcellus, furveying from an eminence the vaft and opulent city which was about to fuffer all the miferies of a capture, is faid to have fhed tears, becaufe he could not perfuade the inhabitants to fave themfelves from plunder by a timely furrender. They were deaf to remonftrances, and Marcellus had to fuftain a furious attack from the Carthaginians without, and the Syracufans within, which he repulfed with vaft lofs to the affailants. A plague which broke out in Syracufe added to the calamities of that unfortunate city: it ravaged likewife the Carthaginian camp to fuch a degree as to break it up after carrying off the commander. It was not, however, till the end of three years, that Syracufe was taken by affault, when it was impoffible to fave the inhabitants from the effects of a fack : the houfes were pillaged, and many citizens were put to the fword, among whom was Archimedes, whofe fate was particularly afflicting to Marcellus, and who was flain while he was calmly working a mathematical problem. The Roman commander, as foon as he was able, put an end to the atrocities of his foldiers, and difplayed much perfonal clemency and humanity to the vanquifhed, but he carried away all the public monuments of art which decorated Syracufe for the ornament of Rome. Marcellus continued fome time longer in Sicily, but his laft action ended in a confiderable victory obtained over the combined forces of Hanno and Epicydes, after which he returned to Rome with great glory. In the year 210 B.C. he was again chofen conful, when he was accufed by the Syracufans with cruelty and a violation of treaty. He was, however, after due enquiries, acquitted of the charges, and his fubfequent behaviour would have done honour to any man : he raifed up the Syracufan deputies, who had been his accufers, and had fallen at his feet to implore forgivenefs, affured them not only of his pardon, but of his future protection, and obtained of the fenate that the people of Syracufe fhould be reinftated in their liberties, and confidered as the allies of Rome. They, unwilling to be behind in refpect for his manly virtues, expreffed their gratitude to him by a decree, that when he or any one of his family fhould vifit Sicily, the people fhould walk in proceffion before him, crowned with garlands, and celebrate the day with public facrifices ; and that thenceforth the whole ifland fhould be under the peculiar patronage of the Marcelli. After this Marcellus was a fecond time called upon to oppofe Hannibal. He difplayed as ufual his great military talents in his operations againft this general, but was not fufficiently vigilant againft the fnares of his adverfary. He imprudently feparated himfelf from his camp, and was killed in ambufcade in the 60th year of his age, and in his fifth confulfhip, being the year 208 B.C. When the body of this great commander was brought to Hannibal, he furveyed it a confiderable time in thoughtful filence ; and caufed it to be buried, or, as others fay, to be burned on a funeral pile, and then fent the afhes enclofed in a filver urn, and crowned with laurel, to his fon. Plutarch.

MARCELLUS I., pope, a native of Rome, became a prefbyter under Marcellinus, and was his fucceffor in the bifhopric of that city in the year 308, after the fee had been vacant for more than three years and a half. The particulars relating to this pope are not given on fufficient authority. It is faid, in his epitaph, written by pope Damafus, that his firmnefs in maintaining the difcipline of the church, and in obliging thofe who had fallen during the times of perfecution to give proof of the genuinenefs of their repentance, excited againft him the general hatred, which was not confined to private difputes and divifions, but ended in public tumults, bloodfhed, and murders. He adds, that Marcellus was fent into banifhment, and died in the fecond year of his pontificate, in the year 310. The church of Rome has given him a place in her lift of martyrs, but in the moft ancient martyrologies he has only the title of confeffor. Moreri. Bower.

MARCELLUS II., pope, a native of Fano, in the Marche of Ancona, was fon to the receiver-general of the revenues of the holy fee. He was educated at Sienna, and honourably diftinguifhed himfelf in literary purfuits. He afterwards went to Rome under the pontificate of pope Paul III., who appointed him his principal fecretary. He accompanied cardinal Farnefe, the nephew of the pope, to attempt to bring about a reconciliation between Francis I. and the emperor Charles V.: he at this time had the title of bifhop, and was promoted to three different fees in fucceffion, and upon his return to Rome, Paul created him cardinal prefbyter of the holy crofs of Jerufalem, and nominated him one of the prefidents of the council of Trent. He fucceeded to the popedom on the death of Julius III., in the year 1555. He is reprefented as being a man of inflexible integrity, of invincible refolution and conftancy, and as having formed great defigns for the reformation of the court and of the clergy, but he died before he could carry any of them into execution, and within a month of his confecration. Bower. Moreri.

MARCELLUS, in *Geography*, a military and poft-town of America, in Onondago county, New York, fituated on Skaneatates lake, 11 miles W. of Onondago caftle ; incorporated in 1794, and containing 909 inhabitants.

MARCENAT, a town of France, in the department of the Cantal, and chief place of a canton, in the diftrict of Murat. The place contains 2058, and the canton 8957 inhabitants, on a territory of 282½ kiliometres, in 7 communes.

MARCENOPOLI, a town of Bulgaria, anciently Marcianopolis: it was deftroyed by Attila; 20 miles W.N.W. of Varna. N. lat. 43° 10'. E. long. 27° 24'.

MARCGRAVE, or MARGRAVE, a kind of dignity in Germany, anfwering to our marquis.

The word is derived from the German *marche*, or *marke*, which fignifies *a frontier*, formed, as Junius conjectures, from the laft fyllable of the Greek τεκ-μαρ, which fignifies both *a mark*, and *a limit ;* and *graffe, count, governor ;* marcgraves being originally governors of cities lying on the frontiers of a country or ftate.

MARCGRAVIA, in *Botany*, was named by Plumier, in memory of George Marcgraf de Liebftad, a native of Saxony, who travelled with Pifo in the Brafils, and fubfequently vifited the coafts of the Mediterranean. He died in paffing over to Africa, at the age of 34, in 1644. His account of the plants, animals, and inhabitants of the Brafils, has been publifhed by De Laet, along with fome of the writings of Pifo, in a folio volume, dated 1648, illuftrated with wooden cuts. The eighth book of this is repeated in another edition of the works of Pifo, with thofe of Bontius, publifhed at Amfterdam, in 1658. Marcgraf is mentioned by Pifo, p. 107 of the laft-mentioned volume, as "his excellent and very diligent domeftic, of fome of whofe drawings and obfervations he has made ufe, which he acknowledges,

acknowledges, left evil-minded perfons fhould accufe him of enriching his works with ftolen decorations." Linnæus fays, *Crit. Bot.* 79, that a relation of Marcgraf has accufed Pifo of deriving all his information from the papers of the former, after his death. He is reported, moreover, to have been himfelf the fervant of the man he attempts, in that refpect, to debafe. It feems that Marcgraf was of a good family, unlefs his furname (de Liebftad) merely, as Haller fuppofes, indicates the place of his birth. Pifo became a phyfician at Amfterdam. (See PISONIA hereafter in its proper place.) Linn. Gen. 260. Schreb. 347. Willd. Sp. Pl. v. 2. 1127. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. ed. 2. v. 3. 284. Juff. 244. Plum. Gen. 7. t. 29. Lamarck Illuftr. t. 447.—Clafs and order, *Polyandria Monogynia.* Nat. Ord. *Putamineæ*, Linn. *Capparides*, Juff.

Gen. Ch. *Cal.* Perianth inferior, permanent, of fix imbricated, roundifh, broad, concave leaves; the two outermoft largeft. *Cor.* of one petal, vertical, ovate, fomewhat conical, undivided, covering the organs of impregnation like a cap, at length feparating all round at the bafe, deciduous. *Stam.* Filaments numerous, awl-fhaped, fhort, fpreading, deciduous; anthers large, ovate-oblong, erect. *Pift.* Germen fuperior, ovate; ftyle none; ftigma capitate, permanent. *Peric.* Berry globofe, coriaceous, of many cells, and many imperfect valves. *Seeds* numerous, fmall, oblong, lodged in foft pulp.

Eff. Ch. Corolla of one petal, vertical, cap-fhaped, deciduous. Calyx of fix imbricated leaves. Berry of many cells. Seeds numerous.

1. M. *umbellata.* Climbing Marcgravia. Linn. Sp. Pl. 719. Jacq. Amer. 156. t. 96. (M. fcandens; Browne Jam. 244. t. 26. Plum. Ic. t. 173. f. 1.)—Native of woods in South America and the Weft Indies. Browne fays it is frequent in Jamaica. The *ftem* is at firft flender and weak, climbing up the trunks of large trees, by means of fibres like thofe of ivy, and furnifhed with alternate heart-fhaped, emarginate, entire *leaves*, on very fhort footftalks. When it reaches the fummit, it "lays its trunk," fays Browne, "more commodioufly over fome of the larger branches of the tree: then it begins to ftrengthen, and cafts many flender, dependent and fubdivided branches from the upper parts. But as it increafes at the top, the ftem grows thicker, feparates from the fupporter, throws off its now ufelefs leaves and roots (fibres), and appears a ftrong withey fhrub, whofe trunk is frequently no lefs than four or five inches in diameter." The pendulous *branches* are a foot or two in length, roundifh, warty, bearing numerous, alternate, elliptic-oblong, pointed, entire, fmooth, fomewhat flefhy *leaves*, on fhort ftalks, fpreading in two directions, each about three inches long, furnifhed with a ftrong rib, and feveral fmall tranfverfe veins. *Stipulas* none, except a little intrafoliaceous gland, juft above the infertion of each footftalk. *Umbel* terminal, pendulous, folitary, fimple, of about a dozen *flowers*, on widely fpreading downy ftalks, fwelling upwards, above an inch long. The *flowers* appear to be turned downwards. Their *corolla*, while it remains, gives them the appearance of fmall acorns, being about one-third of an inch long, and might eafily be miftaken for a feed-veffel. Of its colour we find no mention. The *fruit* is the fize of a moderate goofeberry, with a thick rind, which is but imperfectly difpofed to fplit into valves. The internal partitions originate from it, and are narrow and thin. The pulp and *feeds* are faid to be of a vivid fcarlet. We prefume, from the natural affinities of this plant, that it is of a poifonous quality. Its greateft peculiarity confifts in four, five, or more appendages to the umbel, placed in the centre, each on a ftalk half the length of the flower-ftalks. Thefe are above an inch long, tubular, obtufe, and clofed at the extremity, but furnifhed with a dilated lip at their orifice where the ftalk is inferted. Being, from the pofition of the umbel, pendulous, Browne fays they catch the water that trickles down the branch in rainy weather; but their ufe has not been fully explained. Linnæus fuppofed them *nectaries*. If fuch, they may ferve to tempt infects or humming-birds to frequent the flowers, and affift impregnation, as in numberlefs other cafes.

Willdenow has adopted another fpecies, *M. coriacea*, from Vahl's *Eclogæ*. Of this magnificent plant we have been favoured by Mr. T. F. Forfter with a fine fpecimen from Guiana. It has the habit of *M. umbellata*, but more elliptical, obtufe, coriaceous, fhining, and almoft veinlefs, *leaves*. The *umbel*, like all the other parts, is much larger. The fuppofed *nectaries*, or pouches, grow, without any ftalks, on the lower part of each flower-ftalk, and are fhorter and more inflated than thofe of the former. This plant has certainly all the habit of the genus in queftion, but neither Vahl nor Willdenow feems to have known any thing of the *corolla*, which is totally different, confifting of five feparate concave *petals*, fo that it proves to belong to Schreber's genus *Afcium*, the *Norantea* of Aublet; which differs in that refpect only from Marcgravia, having exactly the fame fort of pouches, though they have been called *bracteas*, becaufe the inflorefcence in Aublet's plant is racemofe. *Marcgravia*, therefore, differs from *Afcium* exactly as Swartz's *Calyptranthes* differs from *Myrtus*, and no further; for the difference in their inflorefcence, which might have been thought of fome moment, is done away by this new fpecies, which is in that refpect a *Marcgravia*, though in generic character an *Afcium*. See ASCIUM and CALYPTRANTHES.

MARCH, MARTIUS, in *Chronology*, the third month of the year, according to the common way of computing.

Among the Romans, March was the firft month: and, in fome ecclefiaftical computations, that order is ftill preferved; as particularly in reckoning the number of years from the incarnation of our Saviour, which is done from the 25th of March.

In England, (before the alteration of the ftyle,) March, properly fpeaking, was the firft month in order, the new year commencing from the 25th; though, in complaifance to the cuftoms of our neighbours, we ufually ranked it as the third; but, in this refpect, we fpoke one way, and wrote another.

Till the year 1564, the French reckoned the beginning of their year from Eafter; fo that there were two months of March in one year, one of which they called *March before Eafter*, and the other *March after Eafter*; and, when Eafter fell within the month of March, the beginning of the month was in one year, and the end in another.

It was Romulus who divided the year into months: to the firft of which he gave the name of his fuppofed father Mars. Ovid, however, obferves, that the people of Italy had the month of March before Romulus's time; but that they placed it very differently, fome making it the third, fome the fourth, fome the fifth, and others the tenth month of the year.

In this month it was that the Romans facrificed to Anna Perenna; that they began their comitia; that they adjudged their public farms and leafes; that the miftreffes ferved the flaves and fervants at table, as the mafters did in the Saturnalia; and that the Veftals renewed the facred fire.

The month of March was always under the protection of Minerva, and always confifted of thirty-one days. The ancients

cients held it an unhappy month for marriage, as well as the month of May.

March, in *Geography*, a market-town in the parish of Doddington, hundred of Witchford, isle of Ely, Cambridgeshire, England, is situated 26 miles distant from Cambridge, 15 from Ely, and 81 from London, nearly midway between Chatteres and Wisbech, on the banks of the river Nene; from which circumstance it has the advantages of a considerable trade. The population, as returned to parliament in the year 1801, was 2514, occupying 555 houses. The chapel is a spacious edifice, with a spire, erected about the year 1343. A market is held on Fridays, and three fairs annually. Many Roman remains have been discovered in this vicinity. When the road was making from March to Wisbech, in the year 1730, three urns were dug up, full of burnt bones and ashes; and also a pot, containing 160 Roman denarii, of all the emperors from Vespasian to Antoninus Pius, but chiefly of the latter. Various other coins have been found, and an altar 21 inches high. Beauties of England and Wales, vol. ii.

March, in *Military Language*, is in general the motion of a body of men from one place to another.

The beat of the drum, upon particular occasions, is likewise called the *march*; which see. It is likewise a word of command, when a battalion is to alter its disposition.

Neither music nor drums are now used to regulate the march, which is in three measures. 1. Ordinary time, in which 75 paces are taken in a minute. 2. Quick time, in which there are 108 steps in a minute. 3. The quickest time, or wheeling march, which is at the rate of 120 steps of 30 inches each, or 300 feet in the minute. This last is used only for wheeling. For a more particular account of the subject of this article, see Battalion.

As many accidents may happen in the march of an army from defiles, marshes, woods, and the like, it is the prudence of a general to order his march accordingly, and to take care that the columns of his army have a free communication one with the other. The march of an army is composed of an advance guard, the main body, and the rear guard, and is sometimes in two, four, six, or eight columns, according as the ground will allow.

The order of march of the troops must be so disposed, that each should arrive at their rendezvous, if possible, on the same day. The quarter-master-general, or his deputy, with an able engineer, should sufficiently reconnoitre the country, so as to obtain a perfect knowledge both of that and of the enemy, before he forms his routes. Before a march, the army generally receives several days' bread. The quarter-masters, camp-colour men, and pioneers, parade according to orders, and march immediately after, commanded by the quarter-master-general, or his deputy. They are to clear the roads, level the ways, make preparation for the march of the army, &c. The "general," for instance, beats at two, the "assembly" at three, and the army commence their march in 30 minutes after. Upon beating the "general," the village and general officer's guards, quarter and rear-guards, join their respective corps, and the army pack up their baggage. Upon the "assembly," the tents are to be struck, and sent, with the baggage, to the place appointed. The companies draw up in their several streets, and the rolls are called. At the time appointed, the drummers are to beat a march, and fifers play at the head of the line; upon which the companies march out from their several streets, form battalions as they advance to the head of the line, and then halt. The several battalions will be formed into columns by the adjutant-general, and the order of march, &c. be given to the general officers who lead the columns. The cavalry generally march by regiments or squadrons. The heavy artillery always keep the great roads, in the centre of the columns, escorted by a strong party of infantry and cavalry. The field-pieces move with the columns. Each soldier generally marches with 60 rounds of powder and ball, and three good flints; one of which is to be fixed in the cock of his fire-lock. The routes must be so formed, that no column may cross one another on the march. See Battalion.

March, in *Music*, a military air played by martial instruments to regulate and mark the steps of the soldiery, to which the drums usually beat time. There are military pieces for field instruments on the parade, which are called *marches*, though the regiment or corps is stationary.

In Persia, according to Chardin, when a building is to be pulled down, the ground to be levelled, or any work to be performed that requires dispatch, and the united efforts of a multitude, all the inhabitants of a district are assembled, who work to the sound of instruments, and the business is done with more zeal and promptitude than it would be in silence.

Marshal Saxe, in his Reveries, shews, that the effect of drums is not confined to a mere useless noise; but as the pulsations are more or less rapid, they naturally inform the soldier to accelerate or retard his pace. It may also be said, that the melody or movement of marches should have different characters, according to the occasions upon which they are played; and this is implied by the names given to certain beatings of the drum, as the general, the retreat, the charge, &c.; but all the advantages of such signals have not been taken that might be. The measures that are beaten or played, have hitherto been confined to one style, to suit the common beat of the drum. And there are many airs that are denominated marches which fulfil that object very imperfectly. The French troops (said Rousseau, in 1768,) having few military instruments for the infantry, except fifes and drums, have likewise very few marches, and these, in general, ill composed; but how admirable are those in the German troops. It is only the infantry and light horse that have particular marches. The kettle-drums of the cavalry have no regular march; the trumpets have only a single note sometimes, and never more than a *tantare*, or flourish. The march, pace, or movement, in music, is used figurately by the French in speaking of the succession of sounds in melody, which follow each other in a certain order; as the base and treble proceed by contrary motion, the base moves in quavers, the treble in semiquavers, &c. For the argreement between the musical air and the military steps, Rousseau has given the first part of the march of the Mousquitaires of the king of France at the time when his Dict. de Mus. was printed, which we have copied in our musical plates. It was found by English travellers, four or five years after Rousseau's Dict. was published, that the French military music in Flanders was very much improved by the adoption of the instruments and style of music used in the bands of the Walloon and German regiments in the Austrian Netherlands. German Musical Tour, vol. i.

In the Supplement to the first edition of the Encyclopédie, it is truly said, that a march should be always composed in common time, with an odd crotchet or quaver at the beginning; and that it is almost impossible to march in cadence to a movement in triple time, unless it is composed in such a manner that the cæsura is felt at the end of every two bars; that is to say, unless the composer has written an air in common time, as if it were in triple.

The arsis, or up part of the bar, naturally marks the lifting up of the foot in marching; on which account the air usually begins with an odd note.

Of

Of the marches and military mufic of our anceftors, we may form fome judgment by the remains of our venerable compofer, William Bird, tranfcribed in the Virginal book of lady Nevil, which is ftill preferved, and in the poffeffion of Dr. Burney. This book, curioufly written in 1591, contains no lefs than forty-two pieces by the admirable Bird; among which are the following military movements, fet for the Virginal by that venerable compofer, and very neatly copied on fix-line paper.

The orthography of the names of the tunes, and of the copyifts termination of the MS. are here preferved.

The March before the Battell.
The Battell.
The March of Footmen.
The March of Horfemen.
The Trumpetts.
The Irifhe March.
The March to Fighte.
Tantara.
The Battells bejoined.
The Retreat.
The Galliarde for the Victorie.

We fhall give the motivo, or fubject, of fome of thefe pieces, on one of the mufic plates.

The copyift of this curious MS. having terminated his labour, has made the following record of his achievement.

finis:

ffinifhed and ended the feventh of September in the yeare of our Lorde God, 1591, and in the 33d yeare of the raigne of our fofferaigne ladie Elizabeth by the grace of God queene of Englande, &c.

By me Jo: Baldwine of Windfore:
Laudes: Deo.

March, Ausias, in *Biography*, the beft known of the Limofin poets, was born in Valencia, of Catalan parents, and flourifhed about the middle of the 15th century. He was educated in the duke of Gandias houfhold, and married a woman of noble family, but, like Petrarch, whofe example he followed, he fell in love with another man's wife, and fpent his time in writing verfes upon her in the Provençal ftyle. Could the Catalans have fhaken off the yoke of Arragon, againft which they ftruggled, their dialect would have become a cultivated tongue, and Aufias March would have been the father of its poetry. As it is, his reputation is very great, confidering the obfolete language in which he wrote. His poems have been frequently printed: the earlieft edition is that of Valencia, in 1539. The Valladolid edition of 1555 contains a copious gloffary, with obfervations on the grammar and pronunciation of the language. Gen. Biog.

MARCHAND, Prosper, born towards the clofe of the 17th century, was brought up in the bookfelling trade at Paris, and acquired a great knowledge of books and literary anecdotes. His attachment to the Proteftant religion, and his connection with Bernard, the continuator of the "Nouvelles de la Republique des Lettres," induced him to remove to Holland, where he acted fome time as a bookfeller, till at length he entirely devoted himfelf to literature. His ftudies led him chiefly to bibliography and French hiftory, and on thefe topics he was occafionally confulted by perfons from all parts of Europe. He took an active and leading part in the "Journal Literaire," and he furnifhed other literary journals with curious extracts, which he had collected by his extenfive courfe of reading. He died at an advanced age in 1756, and left his library and manufcripts to the univerfity of Leyden. He had publifhed, in 1740, "L'Hiftoire de l'Imprimerie:" "Dictionnaire Hiftorique; ou, Memoires Critiques et Literaires;" and a new edition of "Bayle's Dictionary and Letters."

Marchand, John Lewis, a celebrated French organift during the early part of the laft century, ufually performed at the Jefuits' church of St. Benoit, rue St. Jaques, and at the Cordeliers, where he was followed by all Paris, and always heard with new pleafure. Rameau, his friend and moft formidable rival, frequently declared, that the greateft pleafure of his life was hearing Marchand perform; that no one could be compared to him in the management of a fugue; and that he believed no mufician ever equalled him in extempore playing. The Germans relate a ftory, which no French writer has confirmed: that Marchand, being at Drefden, challenged to a trial of fkill all the organifts of Germany, which none but Sebaftian Bach ventured to accept. It was an honour, fays M. Marpurgh, for Pompey to be only defeated by Cæfar, and to Marchand to have no fuperior but Bach. His independent and difinterefted fpirit, fays M. Laborde, prevented him from ever thinking of his fame or his fortune. As he chiefly loved to play extempore, he feldom committed his thoughts to paper, and has left only two books of harpfichord leffons behind him. He was more happy in his mind and fancy when he played the organ to two or three real connoiffeurs, during the hours that the church was fhut, than when on feftival days he drew together a crowded congregation to hear him. It was at fuch times that he chiefly exerted himfelf and feemed infpired; on other days he only performed what belonged to the fervice of the mafs. This mufician was born at Lyons in 1669, and died at Paris in 1732.

MARCHANTIA, in *Botany*, fo named by John Marchant, in the Memoires de l'Acad. des Sciences for 1713, in honour of his father Nicholas, author of feveral effays in the fame collection. There feems to be a confufion betwixt thefe two perfons, and Nicholas the fon of the former, in Haller's Bibl. Bot. and Dryander's Bibl. Banks. Linn. Gen. 565. Schreb. 763. Mart. Mill. Dict. v. 3. Hedw. Theor. 96. t. 24—26. Spreng. Crypt. 342. Hudf. 519. With. v. 1. 388. t. 15. f. 60—67. v. 3. 884. Juff. 9. Lamarck Dict. v. 3. 107. Illuftr. t. 876. Mich. Gen. 1. t. 1. (Hepatica; Mich Gen. 3. t. 2. Lunularia; ibid. 4. t. 4. Lichen; Dill. Mufc. 515. t. 75—77.)—Clafs and order, *Cryptogamia Algæ*, Linn. *C. Hepaticæ*, Schreb. Nat. Ord. *Algæ*, Linn. *Hepaticæ*, Juff.

Gen. Ch. Male, either ftalked or feffile. *Cal.* Perianth a membranous border, undivided or lobed, permanent, furrounding a tuberculated horizontal difk. *Cor.* none. *Stam.* Filaments none; anthers numerous, oval, of one cell, immerfed vertically in the difk, each encompaffed by a vertical ring, and opening by a pore at the furface of the difk.

Female, on the fame, or a feparate, plant. *Common Cal.* large, ftellated, hemifpherical or conical, flowering underneath, the florets pointing downwards. Perianth feffile, bell-fhaped, membranous, tender, coloured, with four or five teeth. *Cor.* Veil feffile, fhorter than the perianth, oblong or fomewhat globofe, membranous, very thin, crowned with the ftyle, and at length fplitting at the top into from two to five fegments, one of which retains the ftyle at its fummit. *Pift.* Germen feffile, oblong, fomewhat globofe, invefted with the veil; ftyle ftraight or incurved, fhort, prominent from the top of the veil; ftigma fimple. *Peric.* Capfule attached by a capillary fhort ftalk, obovate, of one cell, opening at the top with from five to ten, ufually eight, teeth, which at length become revolute. *Seeds* very numerous, globofe, attached to feveral elaftic, fpirally contorted, threads.

Obf.

Obſ. Some ſpecies bear, beſides the flowers, little cups, toothed at their edges, full of grains which prove to be buds, *gemmæ*. Linnæus, truſting to Dillenius, miſtook theſe for the female fructification, and the real female flowers for male ones, the ſeeds being ſuppoſed the pollen. The true male flowers, aſcertained by Hedwig, were, in the ſpecies in which they were obſerved, thought a mere variation of form.

Eſſ. Ch. Male, Calyx ſalver-ſhaped. Anthers numerous, annulated, imbedded in its diſk.

Female, Calyx peltate, flowering underneath. Capſules deflexed, opening at the top by ſeveral revolute valves. Seeds attached to elaſtic filaments.

This genus is next akin to *Jungermannia*, (ſee that article,) with which it very much agrees in habit, eſpecially with thoſe ſpecies that have no ſtem ſeparate from the leaves, and grows like them in damp umbrageous places. The herbage however is, on the whole, of larger dimenſions than in *Jungermannia*, and the fructification more elaborate, or at leaſt better defined, as well as eſſentially diſtinct in characters.

Five ſpecies are deſcribed as natives of Britain, and Linnæus has two beſides, and we add an eighth from Scopoli, his *triandra*.

1. M. *polymorpha*. Star-headed Marchantia. Linn. Sp. Pl. 1603. Bulliard, t. 291. Hudſ. n. 1. Engl. Bot. t. 210. (M. ſquamis marginalibus, calyce plano; Schmid. Ic. 38. t. 9. Marchantiæ 1—5; Mich. Gen. 2. t. 1. Lichen fontanus major, ſtellatus æquè, ac umbellatus, et cyathophorus; Dill. Muſc. 523. t. 76. f. 6. L. domeſticus minor, ſtellatus æquè, &c.; ibid. 527. t. 77. f. 7.)—Calyx of the female flowers cloven into about ten narrow ſegments.—Very common in damp places, about ſprings, wells, and ſhady court-yards, throughout Europe, varying much in ſize, in proportion to the moiſture of its ſituation; being often a moſt troubleſome weed in gardens, over-running pots that are obliged to be kept moiſt, as well as beds of alpine or American plants. It flowers about Midſummer, and is perennial. Few plants are endowed with ſuch ample and pertinacious powers of propagation. The *fronds* ſpread horizontally, creeping cloſe to the earth, ſtone, or wall, by means of denſe, fibrous, ſoft, and ſilky radicles of a ſhining brown. They are ſeveral inches in extent, bluntly lobed, of a dark ſhining green, fringed with ſcales, and more or leſs reticulated; leſs reticulated and ſhining in Dillenius's t. 77. f. 7, though Schmidel obſerves that it is hardly poſſible to draw a line between theſe two varieties, or ſuppoſed ſpecies. The latter ſeems to grow in drier ſituations than the former. The upper ſurface of the *leaf* or *frond* is ſtudded with ſeveral pale cups, toothed at their edges, half filled with green lenticular buds, as mentioned above. By theſe the plant is copiouſly increaſed, in leſs moiſt places, where it does not readily flower. The proper *flowers* grow from marginal clefts, on erect ſimple ſtalks, from one to three inches high, thoſe of the females talleſt, and on a ſeparate plant. The common *calyx* of the latter is deeply cut into eight or ten deep, linear, radiant, obtuſe ſegments, from the under ſide of which, towards their baſe, the flowers are produced. The ſeeds are yellow, and the ſpiral filaments to which they are attached, have an apparently ſpontaneous motion, which however ariſes merely from their elaſticity, and exquiſite ſuſceptibility of moiſture.

2. M. *chenopoda*. Gooſe-foot Marchantia. Linn. Sp. Pl. 1603. (Lichen anapodocarpos; Plum. Fil. 143. t. 142. Dill. Muſc. 531. t. 77. f. 8.)—Calyx of the female flowers halved, palmate, with four obtuſe ſegments.—Native of the Weſt Indies, on moiſt rocks. The ſegments of the *frond* are oblong, ſinuated or wavy at the edge. *Fruit-ſtalks* nearly terminal. *Common calyx* of the female flowers remarkable for being cut away on one ſide, all its four ſegments being directed the other way, like the fingers of a hand, or toes of a web-footed bird. We have from Jamaica, gathered by Browne, what ſeems to anſwer to Plumier's figure and deſcription, which Dillenius has copied; we have alſo the ſame from Dr. Swartz. In both ſpecimens the upper ſide of the *frond* is beſprinkled with fine pellucid dots or grains. Mr. Dickſon eſteems theſe ſpecimens a different ſpecies from the original one of Plumier.

3. M. *cruciata*. Croſs-headed Marchantia. Linn. Sp. Pl. 1604. Hudſ. n. 2. (Lichen ſeminifer lunulatus, florifer pileatus, tandem cruciatus; Dill. Muſc. 521. t. 75. f. 5. Lunaria vulgaris; Mich. Gen. 4. t. 4.)—Calyx of the female flowers in four deep, croſs-like, tubular ſegments. Native of ſhady damp places in Italy, France, and England, fructifying in July. The *fronds* are ſmaller than in M. *polymorpha*, and dilated outwards. *Flower-ſtalks* each from a toothed cup on the diſk of the leaf. *Common calyx* of the female flowers at firſt conical, but ſoon becoming deeply divided into four ſpreading, cruciform, tubular ſegments, from whoſe extremities the *capſules* and *ſeeds* are protruded. Dillenius has a remark unworthy of ſo great a philoſopher, that "the flowers are rarely produced, but the ſeeds very frequently." Surely, as no ſeeds can come without flowers, this might have led him to diſcover that what he took for ſeeds were really buds!

4. M. *tenella*. Slender Marchantia. Linn. Sp. Pl. 1604. (Lichen pileatus parvus carinatus, capitulis fimbriatis; Dill. Muſc. 521. t. 75. f. 4.)—Calyx of the female flowers hemiſpherical with a little point; its margin radiated.—Gathered by Gronovius in Virginia. The *frond* of this delicate ſpecies ſpreads circularly, but is not all together much above an inch broad. The *ſtalks* are nearly terminal, very ſlender, above an inch high. *Calyx* very convex, crowned with a minute blunt point, and fringed with numerous ſegments that bear the *capſules*.

5. M. *hemiſphærica*. Hemiſpherical Marchantia. Linn. Sp. Pl. 1604. Hudſ. n. 3. Engl. Bot. t. 503. Schmid. Ic. t. 34. (Lichen pileatus parvus, foliis crenatis; Dill. Muſc. 519. t. 75. f. 2. Hepatica media, capitulo hemiſphærica; Mich. Gen. 3. t. 2. f. 2.)—Calyx of the female flowers hemiſpherical, cloven into about five oval ſegments. Stalks naked at the baſe.—Native of Europe, about the banks of rivers and ditches, or the moiſt crevices of rocks, ſometimes in expoſed ſituations, flowering in the early ſpring. The *fronds* are lobed, forming broad patches; their upper ſurface granulated, of a fine green, often purpliſh at the edges. *Stalks* not above an inch high. *Calyx* convex, rounded, without any terminal point; the margin in five, or more, oval ſegments. *Capſules* and *ſeeds* black. By a ſtrange overſight, a barren ſpecimen of this ſpecies was deſcribed as a new genus by Forſter, under the name of *Aitonia*, ſee his *Genera*, t. 74; and adopted by the younger Linnæus, by that of *Rupinia*; ſee his *Suppl.* 69 and 452.

6. M. *triandra*. Three-celled Marchantia. Scop. Carn. ed. 2. 354. t. 63. Web. Goett. 163. (M. tenella; Thunb. Prod. 175.)—Calyx of the female flowers hemiſpherical, undivided, of three or four cells.—Found by Scopoli in Carniola, by Weber in Hercynia, and by Thunberg at the Cape of Good Hope; for the original ſpecimens of the *tenella* of the laſt-mentioned author prove to be this plant. We have others from Siberia, which appear the ſame, but their condition is not ſufficiently good for us abſolutely to decide. This is a ſmall ſpecies, whoſe *fronds* are at moſt but an inch long. *Stalks* half an inch high, or thereabouts, purpliſh. *Calyx* convex, granulated, without a point; its margin

margin wavy, not cut or lobed. *Cells* three or four, very prominent underneath, furnifhed with long, taper, briftle-like appendages. The fpecific name alludes to the old Linnæan idea, of the female being the male flowers.

7. M. *androgyna*. Monoecious Marchantia. Linn. Sp. Pl. 1605. Dickf. H. Sicc. fafc. 4. 21. Crypt. fafc. 2. 17. With. 886. (Lichen pileatus anguftifolius dichotomus; Dill. Mufc. 520. t. 75. f. 3. Hepatica minor anguftifolia, capitulo hemifphærico; Mich. Gen. 3. t. 2. f. 3.)—Calyx of the female flowers hemifpherical, half four-cleft, of four cells.—Native of Italy, France, Switzerland, and Scotland. This is much larger than the laft. *Fronds* two inches or more in length, various in breadth, fmooth. *Stalks* one and a half or two inches high. *Calyx* very convex, fmooth, its margin in four blunt lobes, beneath which the four *cells* are very prominent. Linnæus miftook his Siberian fpecimen above mentioned, which we judge to be *triandra*, for the true *androgyna*, and therefore erred in his fpecific character of this latter. We conceive Scopoli's M. *quadrata*, Carn. ed. 2. 355. t. 63, to be no other than the real *androgyna*.

8. M. *conica*. Conical Marchantia. Linn. Sp. Pl. 1604. Hudf. n. 4. Engl. Bot. t. 504. Schmid. t. 31. (Lichen vulgaris major, pileatus et verrucofus; Dill. Mufc. 516. t 75. f. 1. Hepatica vulgaris major, vel officinarum Italiæ; Mich. Gen. 3 t. 2. f. 1.)—Calyx of the female flowers ovate, pointed, with five marginal notches. Male flowers in feffile warts.—Common in damp fhady places in Britain and other parts of Europe, but the female fructification is rare. The *fronds* are broad, reticulated, bluntly lobed, highly aromatic and fragrant, giving their perfume to the air, efpecially after rain, like many *Jungermanniæ*. *Stalks* from clefts between the lobes, two inches high, white and tender. *Calyx* conical, with four fmall marginal lobes. *Capfules* and feeds black. On feparate plants from thefe are found hemifpherical feffile warts, fuch as M. *androgyna* appears to bear on the fame plant with the capfules, and which Hedwig believes to be the male flowers. We prefume, however, that what are reprefented on a portion of a frond in *Engl. Bot.* are not thefe, but gemmiparous cups, like thofe of M. *polymorpha*, by which the plant is ufually propagated. S.

MARCHAUX, in *Geography*, a town of France, in the department of the Doubs, and chief place of a canton, in the diftrict of Befançon. The place contains 382, and the canton 8894 inhabitants, on a territory of 220 kiliometres, in 38 communes.

MARCHE, Oliver de la, in *Biography*, fon of a gentleman of Burgundy, entered, in early life, into the fervice of Philip the Good, duke of Burgundy, by whom he was highly valued. After this Charles the Bold raifed him to the pofts of mafter of the houfehold and captain of his guards, and knighted him at the battle of Montlheri, in 1465. He was with that prince at the fatal battle of Nancy, and was made prifoner. We find him next, firft mafter of the houfehold to Maximilian of Auftria, and afterwards to his fon the archduke Philip, by whom he was fent on an embaffy to the court of France after the death of Lewis XI. He died at Bruffels in 1501, leaving behind him "Memoirs or Chronicles," relating to the two dukes of Burgundy: thefe were publifhed at Lyons in 1562, and again at Bruffels in 1616 He alfo wrote "Le Parement et le Triomphe des Dames d'Honneur:" "Traitè fur les Duels et Gages de Battaille," and other pieces. Moreri.

Marche, *La*, in *Geography*, was before the Revolution a province of France, bounded on the N. by Berri, on the E. by Auvergne, on the S. by Limofin, and on the W. by Poitou; lying between 45° 45′ and 46° 35′ N. lat., and between 0° 45′ and 2° 31′ E. long.; being from N. to S. 10 leagues, and 20 from W. to E. Its rivers are the Torion, the Great Creufe, the Gartempe, and the Vienne. This province was formerly under the dominion of the Romans, Vifigoths, and Franks. Under the laft of thefe powers it was governed by counts, and was confifcated by Philip the Handfome. Francis I. annexed it to the crown A.D. 1531. Some tracts of this province are tolerably fertile, yielding grain and fruits, and others are covered with excellent pafturage. The foil is compofed of fandy and friable loams, fome on granite, and others on a calcareous bottom. The chief towns in Upper Marche, on the eaftern divifion, are Gueret, Ahun, Aigurande, Aubuffon, Felletin, Bourganeuf, Grandemont, and Benevent; and thofe in Lower Marche are Bellac and Dorat. This province now principally conftitutes the department of the Creufe, and part of that of Vienne.

Marche, a town of France, and principal place of a diftrict, in the department of the Sambre and Meufe, fituated on the Marfette, in the road from Paris to Liege. The place cantains 1257, and the canton 6382 inhabitants, on a territory of 250 kiliometres, in 25 communes. The parifh-church is a handfome ftructure; 20 miles S.E. of Namur.

Marche, *La*, a town of France, in the department of the Vofges, and chief place of a canton, in the diftrict of Neufchateau, fituated near the fource of the Mouzon; 27 miles W.N.W. of Luxeuil. The place contains 1554, and the canton 13,928 inhabitants, on a territory of 335 kiliometres, in 26 communes. N. lat. 48° 4′. E. long. 5° 22′.

Marche, *La*, a fmall territory of Switzerland, in the canton of Schweitz, fituated S. of the lake of Zurich.

MARCHECK, or Marek, a town of Auftria, on the Marfch; 14 miles N.W. of Prefburg. N. lat. 48° 15′. E. long. 16° 56′.

MARCHENA, a town of Spain, in the province of Seville, fituated on a hill, having in its fuburbs the only well in the town or neighbourhood; feven miles S. of Carmona. It was anciently called "Colonia Marcia."

MARCHENOIR, a town of France, in the department of the Loir and Cher, and chief place of a canton, in the diftrict of Blois; 15 miles N. of Blois. The place contains 421, and the canton 8340 inhabitants, on a territory of 260 kiliometres, in 18 communes.

MARCHERS, or *Lords* Marchers, in our *Old Writers*, noblemen that lived on the marches of Wales, or Scotland. Thefe, in times paft, according to Camden, had their laws, and power of life and death, &c. like petty kings. But fuch powers were abolifhed by the ftat. 27 Hen. VIII. cap. 27, and 1 Edw. VI. cap. 10.

MARCHES, Marchia, from the German, *march*, *i.e. limes*, or from the French *marque*, *viz. fignum*, being the notorious diftinction between two territories, are the limits between England and Wales, or Scotland; which laft are divided into weft and middle marches. (4 Hen. V. cap. 7. 22 Edw. IV. cap. 8. 24 Hen. VIII. cap. 9.) And there was formerly a court, called the court of the marches of Wales, where pleas of debt or damages, not above the value of 50*l.* were tried and determined; and if the council of the marches held plea for debts above that fum, &c. a prohibition might be awarded.

Marches, *Les*, in *Geography*, a town of France, in the department of Mont Blanc; four miles W. of Montmelian.

MARCHESI, Luigi, in *Biography*, one of the greateft vocal performers which Italy has produced on the opera ftage fince the firft eftablifhment of the mufical drama, arrived

rived in England in April, 1788. This finger, whofe talents have been the fubject of praife and admiration in every great theatre of Europe, where mufical dramas are performed in the Italian language, firft appeared at Rome in 1774, in a female character, the ufual introduction of a young and promifing finger, with a foprano voice and beautiful perfon. In 1775, he performed the fecond man's part at Milan with Pacchierotti, and at Venice with Millico; but the fame year he was advanced to the principal character at Trevifo. In 1776 and 1777, he fung as firft man at Munich and Padua; and in 1778, he had worked his way to the great theatre of San Carlo at Naples, which is the criterion and poft of honour of an opera finger. He continued here two feafons, and has fince performed with increafing celebrity at Pifa, Genoa, Florence, Milan, Rome, Peterfburg, Vienna, and Turin.

The "Giulio Sabino" of Sarti, was the firft opera in which Marchefi performed on our ftage. The elegant and beautiful mufic of this drama did not pleafe fo much here as it ought, and had done in other parts of Europe. Several of the fongs, indeed, had been previoufly fung here at concerts, and did not appear new. Marchefi's ftyle of finging is not only elegant and refined to an uncommon degree, but often grand and full of dignity, particularly in his recitatives and occafional low notes. His variety of embellifhments and facility of running extempore divifions are truly marvellous. Many of his graces are new, elegant, and of his own invention; and he muft have ftudied with intenfe application to enable himfelf to execute the divifions, and running fhakes from the bottom of his compafs to the top, even in a rapid feries of half notes. But befides his vocal powers, his performance on the ftage is extremely embellifhed by the beauty of his perfon, and grace and propriety of his geftures. We expected a great finger, but that does not always include a fine actor.

As Marchefi was the laft of three great fingers who appeared on our ftage at the latter end of the eighteenth century, and as each had his exclufive admirers, it would be difficult to draw a ftudied parallel between them to the fatisfaction of all parties; comparative praifes, as well as cenfure, would be thought invidious. But as we have received great pleafure from the talents of each of thefe exquifite performers, and never expect to find abilities exactly fimilar in different fingers, we are always thankful for the good we find, and endeavour to hear the reft with candour.

In difcriminating the feveral excellencies of thefe great performers, we fhould without hefitation fay, that Pacchierotti's voice was naturally fweet and touching; that he had a fine fhake, an exquifite tafte, great fancy, and a divine expreffion in pathetic fongs. That Rubinelli's voice was full, majeftic, and fteady; and befides the accuracy of his intonations, that he was parfimonious and judicious in his graces. And that Marchefi's voice was elegant and flexible; that he was grand in recitative, and unbounded in fancy and embellifhments.

All feem to have ftudied their art with great diligence during youth, and to read mufic as eafily as their native language.

As actors: Pacchierotti feemed in earneft on the ftage, and confequently interefted the fpectator. Rubinelli had great dignity in his deportment, though he difcovered but little fenfibility by his geftures or tone of voice. Marchefi, with an elegant figure and pleafing countenance, is at once graceful and intelligent in his demeanour and action.

Marchefi has continued to fupport his character of a great and refined finger, ever fince he quitted England fifteen years ago, and we believe ftill continues to exercife his talents on the ftage.

When the French firft invaded the Milanefe, during the revolution, report fays that he was treated by the military with favage indignity, for declining to obey a peremptory order to fing to the Gallic general's lady; to which he felt a repugnance from gratitude to the Auftrian government, under which he had frequently refided, and been not only honourably but kindly treated. On his not inftantly obeying the ungracious order that was fent him, he was feized by a party of foldiers, who, to deface his perfonal charms, deprived him of one eye-brow, and of half his fine head of hair.

MARCHESINA, in *Geography*, a town of Italy, in the department of the Montagna; 10 miles S.W. of Lecco.

MARCHESVAN, in *Chronology*, the eighth month of the Jewifh ecclefiaftical year, anfwering to part of our October and November.

MARCHET, or MARCHETTA, a pecuniary fine, anciently paid by the tenant to his lord, for the marriage of one of the tenant's daughters.

This cuftom obtained, with fome difference, throughout all England and Wales, as alfo in Scotland; and it ftill continues to obtain in fome places. According to the cuftom of the manor of Dinover in Carmarthenfhire, every tenant, at the marriage of his daughter, pays ten fhillings to the lord, which, in the Britifh language, is called *gwahr-merched*, i. e. *maid's-fee*. See AMABYR.

In Scotland and the north parts of England, the cuftom was, for the lord to lie the firft night with the bride of his tenant; but this ufage was abrogated by king Malcolm III. at the inftance of his queen; and, inftead thereof, a mark was paid by the bridegroom to the lord: whence it is called *marcheta mulieris*. See BOROUGH-*Englifh*.

MARCHETTI, LA, in *Biography*, a finger from Bologna, engaged for the Pantheon in 1774. She had a powerful, brilliant, and fweet-toned voice, with which fhe might have become a finger of the firft clafs, if want of health had not prevented her from that perfevering practice, which is fo neceffary to the vanquifhing of vocal difficulties. Befides finging at the Pantheon during her refidence in England, fhe performed the fecond woman's part in Sacchini's operas of "Nitteti" and "Perfeo."

MARCHETTI, PETER DE, a phyfician, was profeffor of anatomy at Padua, his native place, where he continued to teach that art from 1652 until 1669, when he was allowed to refign his chair to his fon Anthony. In the year 1661, he alfo obtained the appointment to the firft profefforfhip of furgery, the duties of which he fulfilled at the fame time with thofe of his anatomical chair. His merits in thefe departments of the profeffion obtained for him the honour of knighthood of the order of St. Mark. At the age of 80 years, he retired altogether from the univerfity; and, after having enjoyed a fhort period of repofe, he died in April 1673. He left the following works: "Anatomia," in 4to. Venice, 1654. "Sylloge Obfervationum Medico-chirurgicarum rariorum," Padua 1664, which was afterwards feveral times reprinted, and was tranflated into German. It contained fifty-three cafes of fome intereft, and three tracts on ulcers, on fiftulæ of the urethra, and on fpina ventofa.

His two fons, DOMINIC and ANTHONY DE MARCHETTI, were likewife both profeffors in their native univerfity of Padua. The former was author of a good compendium of anatomy, according to the judgment of Haller, which

paffed

paſſed through ſeveral editions, under the title of "Anatomia, cui Reſponſiones ad Riolanum, Anatomicum Pariſienſem, in ipſius animadverſionibus contra Veſlingium, additæ ſunt," Padua 1652, &c. Eloy Dict. Hiſt. de Med.

Marchetti, Alexander, a poet and mathematician, was born at Pontormo, in the Florentine territory, in the year 1632. Being deprived at a very early period of his father, he was intended for a mercantile life; but it being ſoon diſcovered that he had decidedly a literary turn, he was placed with a profeſſor of the civil law. This proved as little adapted to his taſte as trade; and he was ſent by the kindneſs of Leopold, cardinal de Medici, to the univerſity at Piſa, where he purſued his favourite ſtudies in belles lettres, in conjunction with philoſophy and mathematics, in the latter of which he enjoyed the particular inſtructions of Borelli. He took a doctor's degree in 1659, and became profeſſor of logic in that univerſity, and alſo taught the elements of geometry to a private claſs under Borelli. In 1669 he publiſhed a mathematical work, entitled "Reſiſtentia Solidorum;" and in a ſhort time after, another with the more general title, "Exercitationes Mechanicæ." By the former he gained a high reputation; but the latter did not at all anſwer the expectations which he had raiſed by the other. About the ſame period he accompliſhed his tranſlation of Lucretius, "De Rerum Natura," into Italian blank verſe, which has contributed more to eſtabliſh his fame than all his other pieces. It has been ſaid that it ſurpaſſes almoſt every other claſſical verſion in modern language, in dignity, elegance, and clearneſs. Marchetti was deſirous of dedicating this performance to Coſmo III., great duke of Tuſcany; but the piety of that prince was ſo much ſhocked by the impious doctrines of the Epicurean philoſophy, that he not only refuſed the dedication, but prohibited the publication of the work in his dominions; and it was not printed till after the author's death, by Paul Rolli, in the year 1717. It has ſince been frequently reprinted, and is allowed a place among ſtandard works of the kind. He died in the year 1714, in his eighty-third year. In his youth he had tranſlated the firſt five books of the Æneid, and likewiſe the odes of Anacreon. He had alſo compoſed ſeveral original poems, eſpecially of the lyric kind, which were reckoned to poſſeſs great merit. Theſe and other pieces have been printed in collections of Italian poetry. Marchetti had a very high opinion of his own talents as a mathematician and philoſopher; but he was, at the ſame time, mild and eaſy, and ready to do good offices to any perſons. He had been in habits of correſpondence with many literary characters of diſtinguiſhed eminence.

MARCHETTO da Padova, an intelligent writer on muſic in the thirteenth century, of whoſe works we found two inedited MSS., preſerved in the Vatican library, N° 5322. The firſt is entitled "Lucidarium Artis Muſicæ planæ," beginning, "Cum inquit," &c.; and the ſecond, "Pomerium Artis Muſicæ Menſurabilis: quatuor ſunt Cauſæ," &c. The Lucidarium is frequently mentioned by Franchinus, Pietro Aaron, and other old muſical writers of Italy.

There was a copy of this laſt-mentioned tract in the Ambroſian library at Milan, in 1770, D. 5, in folio, where it is ſaid to have been begun at Ceſena, and finiſhed at Verona, 1274: "Lucidarium in Arte Muſicæ planæ, inchoatum Ceſena, perfectumque Veronæ," 1274. The copy of his works in the Vatican was dedicated to Charles, king of Sicily, about the year 1283: "Marchettus Paduanus qui ſuum opus Karolo Regi Siciliæ dedicavit circa annum 1283."

We obtained large extracts from this MS., as it contained the moſt early mention that we had met with of the *dieſis*, or accidental *ſharp*, of *chromatic counterpoint*, *diſcords*, and the proportions of ſuch concords and diſcords as are uſed by the moderns in practical harmony.

His examples of counterpoint, in the MS. whence our extracts were made, like thoſe of Franco, are written upon only one ſtaff of four, five, ſix, or more lines, according to the diſtance of the intervals, with two clefs, one for the baſe, and one for the tenor or upper part, with this peculiarity of notation, that the notes of the upper part are written in *red* ink, and the lower in *black*.

This MS. contains many curious attempts at infant harmony. Marchetto is the firſt who ſpeaks of diſcords and their reſolution; and lays it down as a rule, that no two ſevenths, or fourths, uſed as diſcords, ſhould ſucceed each other; and that after a diſcord, the part which has offended the ear ſhould make it amends by becoming a concord, while the other ſtands ſtill: indeed he never mentions the preparation of diſcords.

Marchetto Cara, an Italian ſinger, mentioned with Bidon, another contemporary vocal performer, with great eloge, by Caſtiglione, in his "Cortegiano," written about the beginning of the ſixteenth century. What kind of ſecular muſic the Italians cultivated, before the general uſe of counterpoint was eſtabliſhed, we know not; but we find in the Lives of their firſt Painters, that many of them had been brought up to muſic, as a profeſſion. Leonardo da Vinci was a great performer on ſeveral inſtruments, and invented a new ſpecies of lyre, in the ſhape of a horſe's ſkull. (Da Teſchio di Cavallo. Vaſari, Vite di Pitt.) Italy had likewiſe, at this time, ſingers with great talents for execution and expreſſion; for Caſtiglione, ſpeaking of the variety and power of contraſt in the arts, obſerves, that "inſtances of diſſimilar things producing ſimilar effects that are equally pleaſing and meritorious may be given in them all; particularly muſic, in which the movement is ſometimes grave and majeſtic, and ſometimes gay and animated, yet equally delightful to the hearer. Thus, in ſinging, what can be more different than the performance of Bidon and Marchetto Cara? The one artificial, rapid, nervous, vehement, and impaſſioned, elevates and inflames the ſoul of every hearer; while the other, more gentle, pathetic, and inſinuating, ſooths, calms, and affects by a ſorrowful and tender ſweetneſs, which penetrates the heart, and affords it the moſt exquiſite pleaſure of a different kind." This deſcription the late Mr. Galliard (Tranſlation of Toſi, p. 170.) has thought applicable to the different powers of the two great female ſingers, Fauſtina and Cuzzoni, the ſuperiority of whoſe abilities was ſo diſputable when they performed on the ſame ſtage in England, 1727, that the patrons and friends of the one became inveterate enemies to thoſe of the other.

Great natural powers will ſometimes aſtoniſh and charm without much aſſiſtance from art; and ſo late as the year 1547, Pietro Aaron (Lucidario in Muſica, fol. 31.) gives a liſt of ſuch extraordinary performers as were able to *ſing by book*, *cantori a libro*; by which we may ſuppoſe that the art was new and uncommon. And according to Tartini, (Trattato di Muſica, p. 17.) "The old Italian ſongs being only made for a ſingle voice, were ſimple in the higheſt degree; partaking of the nature of *recitative*, but *largo*:" (as the gondoliers at Venice ſtill ſing the ſtanzas of Taſſo.) "None were confined to regular bars; and the key was determined by the kind and compaſs of voice that was to ſing them."

However, during the ſixteenth century, when the works of of Paleſtrina appeared, the Italians may with juſtice be ſaid to have given inſtructions to the reſt of Europe in counterpoint, as, ever ſince operas were eſtabliſhed, they have done in ſinging.

MARCHI, Francis, a famous military engineer, who flouriſhed in the ſixteenth century, was a native of Bologna. He is chiefly known by a book, entitled "Della Architectura Militaire," which was publiſhed in 1599, in folio. This, which contains 161 figures, is an extremely ſcarce book; a circumſtance that has been attributed, by ſome Italian writers, to the ſuppreſſion of moſt of its copies by certain French engineers, who paſſed off his inventions for their own. It was probably a work of vaſt labour, as it was begun in the year 1546, and was not compleated till after the death of the author. It is ſaid to contain the germ of ſeveral contrivances, which have ſince been adopted. The Italian writers maintain, that in it is to be found the origin of Vauban's method of fortification; but the French admit only a trifling reſemblance between the two authors. Gen. Biog.

MARCHIENNES, in *Geography*, a town of France, in the department of the North, and chief place of a canton, in the diſtrict of Douay; 7 miles E.N.E. of Douay. The place contains 2309, and the canton 13,493 inhabitants, on a territory of $112\frac{1}{2}$ kiliometres, in 16 communes.

MARCHING, in *Military Language*. See March and Battalion.

Marching *Regiments*, a denomination given to thoſe corps who had not any permanent quarters, but were liable to be ſent not only from one extremity of Great Britain to another, but to the moſt diſtant of her poſſeſſions abroad. Although the term "marching" is inſenſibly confounded with thoſe of "line" and "regulars," it was originally meant to convey the notion of ſomething more than a mere liability to be ordered upon any ſervice; for by marching the regular troops from one town to another, the inhabitants, who from time immemorial have been jealous of a ſtanding army, loſt their antipathy to *real* ſoldiers by the occaſional abſence of regular troops. At preſent, the guards, militia, and fencibles, may be conſidered more or leſs as marching regiments. The marines and volunteer corps have ſtationary quarters.

MARCHIONIS Pulvis, in the *Materia Medica*, a term uſed for a certain compound powder, preſcribed in the Leyden Diſpenſatory, and greatly recommended by many as an anti-epileptic and abſorbent.

The ingredients are, male piony-root, half an ounce, wood of miſletoe of the oak, raſpings of ivory, elks' hoof, ſpodium, the tooth of the unicorn-fiſh, or, in its ſtead, the antlers of the ſtag's horn, red and white coral, and pearls, of each a dram. Theſe are all to be rubbed into a powder, with twenty leaves of pure gold, and given half a dram twice a day.

MARCIAC, in *Geography*, a town of France, in the department of the Gers, and chief place of a canton, in the diſtrict of Mirande; 10 miles W. of Mirande. The place contains 1479, and the canton 8008 inhabitants, on a territory of $177\frac{1}{2}$ kiliometres, in 22 communes. N. lat. 43° 31'. E. long. 0° 14'.

MARCIANA, a town of Etruria; 30 miles E. of Florence.

MARCIANISI, a town of Naples, in Lavora; 10 miles N. of Naples.

MARCIANUS, in *Biography*, emperor of the Eaſt, was born of obſcure parents about the year 391. His father ſerved in the Roman army, into which he himſelf entered as a private ſoldier. Owing to ſickneſs, he quitted the ſtation in 421; and upon the return of his health, he repaired to Conſtantinople, and enrolled himſelf among the troops commanded by Ardaburius, and his ſon Aſpar. By his talents and good conduct he was raiſed to the poſt of ſecretary, in which quality he attended Aſpar into Africa in 431. He was there taken priſoner by Genſeric, who agreed, after a time, to liberate him upon a promiſe never more to ſerve againſt the Vandals. He ſoon attained the rank of tribune and ſenator; and on the death of Theodoſius the younger, in 450, he was aſſociated in the empire with Pulcheria. Attila was, at this time, threatening both empires. He had already ſent an inſolent meſſage to the court of Conſtantinople, demanding the annual tribute which had been extorted from the weakneſs of Theodoſius. The newly crowned emperor was not to be ſo treated: he boldly replied, "that he had gold for his friends, but had prepared ſteel for his enemies." This determined ſpirit was probably the reaſon that Attila turned his arms againſt the weſtern empire, rather than the eaſtern. By the death of Pulcheria, he became ſole poſſeſſor of the throne. He executed with the moſt pious fidelity her laſt wiſhes, by which ſhe left a vaſt property to the church and the poor. After the death of Attila, ſeveral tribes of barbarians deſerted the banners of his ſons, and obtained permiſſion from Marcianus to ſettle in Thrace and Illyrium; which countries had been almoſt depopulated by the incurſions of the Huns. He died, much regretted, in the year 457, after a reign of about ſix years and a half. His piety and zeal in defence of orthodoxy were highly applauded by eccleſiaſtical writers: his rigorous edicts againſt heretics, and his kindneſs in recalling thoſe who had been exiled on account of tenets which he eſpouſed, gave him a high rank, and the title of ſaint in the Greek church; and he is entitled to general praiſe for his having beſtowed his promotions only on perſons of known abilities and unblemiſhed character, whence the departments of the ſtate were at all times filled with credit. Univer. Hiſt. Gibbon.

MARCIGLIANO, in *Geography*, a town of Naples, in Lavora; 9 miles N.E. of Naples.

MARCIGNY, a town of France, in the department of the Saone and Loire, and chief place of a canton, in the diſtrict of Charolles; 12 miles S.W. of Charolles. The place contains 2414, and the canton 10,403 inhabitants, on a territory of 200 kiliometres, in 12 communes. N. lat. 46° 17'. E. long. 4° 7'.

MARCILLOT, a town of France, in the department of the Allier, and chief place of a canton, in the diſtrict of Montluçon. The place contains 1414, and the canton 10,002 inhabitants, on a territory of 255 kiliometres, in 16 communes.

MARCILLY a la Hayer, a town of France, in the department of the Aube, and chief place of a canton, in the diſtrict of Nogent-ſur-Seine. The place contains 488, and the canton 6049 inhabitants, on a territory of 400 kiliometres, in 24 communes.

MARCIONITES, or Marcionists, *Marcioniſtæ*, in *Eccleſiaſtical Hiſtory*, a very ancient popular ſect of heretics, who, in the time of St. Epiphanius, were ſpread over Italy, Egypt, Paleſtine, Syria, Arabia, Perſia, and other countries: they were thus denominated from their author Marcion.

Marcion was of Pontus, the ſon of a biſhop, and at firſt made profeſſion of the monaſtic life; but he was excommunicated by his own father, who would never admit him again into the communion of the church, not even on his repentance. The cauſe of his father's diſpleaſure is ſaid by Epiphanius to have been a criminal connection with a young woman;

woman; but Beaufobre and Lardner have alleged a variety of reafons that render this ftory incredible, and that lead them to fuppofe that it was a fabrication of Epiphanius. Beaufobre fuppofes that the crime of this herefiarch, for which his father expelled him from the church, was his errors, which he had began to publifh in his own country. On this excommunication, he abandoned his native land, and retired to Rome, where he became acquainted with Cerdon, and, as fome have faid, became his difciple; and adopting his opinions, zealoufly propagated them.

Cave fuppofes that he came to Rome in the year 127; and that about the year 130 he became a follower of Cerdon, and an open heretic. According to Pagi, Marcion came to Rome after the death of Hyginus, which, he thinks, cannot be deferred beyond the year 141. But he had before broached his opinions in Syria, probably in the reign of Adrian, or at leaft in the beginning of the reign of Antoninus the Pious. When he came to Rome, the fee was vacant by the death of Hyginus; but as the prefbyters did not receive him, he returned to Afia, and fpread his tenets with lefs difguife and greater zeal, about the year 144, where Tertullian and alfo Petavius place him. As Juftin Martyr wrote againft Marcion, and his "Apology" was written in the time of the elder Antoninus, in the year 140, or not long after, it is reafonable to think, fays Dr. Lardner, that Marcion had appeared in the year 130, or very foon after; for Marcion had many followers when Juftin wrote that Apology: and when he fays that Marcion was ftill living, it is implied that he had made a figure for fome time.

Marcion, according to Theodoret, maintained the exiftence of four principles, or unbegotten fubftances, as his expreffion is: one the good God, and unknown, whom he alfo calls the father of our Lord Jefus Chrift; and the Creator, called by him juft, and fometimes evil; and, befides thefe, Matter, and the evil one that governs it. Some, as Epiphanius and Cyril of Jerufalem, afcribe to Marcion and his followers the doctrine of three principles; Auguftine fays, that he held two principles; and Tertullian often afferts, that Marcion believed two gods, though not both equal. Dr. Lardner apprehends, that Marcion believed in only two eternals; the Supreme God the Father, who was good, and Matter; for, according to him, the Creator was from the Father; and the Devil, fomehow or other, fprang out of Matter, which he thought to be eternal. After the example of the oriental doctors, fays Mofheim, the Marcionites held the exiftence of two principles; the one perfectly good, and the other perfectly evil: between thefe they imagined an intermediate kind of deity of a mixed nature, who was the creator of this inferior world, and the god and legiflator of the Jewifh nation, who wages perpetual war with the evil principle; and both the one and the other afpire to the place of the Supreme Being, and ambitioufly attempt to fubject to their authority all the inhabitants of the world. The Jews are the fubjects of that powerful genius who formed this globe: the other nations, who worfhipped a variety of gods, were fuppofed to be under the empire of the evil principle. Thefe two conflicting powers exercife oppreffions upon rational and immortal fouls; and, therefore, the fupreme God the Father, who had alfo a world of his own making, but better than this, immaterial and invifible, in order to deliver them from bondage, fent to the Jews a being moft like unto himfelf, even his fon Jefus Chrift, clothed with a certain fhadowy refemblance of body, that he might be vifible to mortal eyes; whofe commiffion was to deftroy the empire of the evil principle, and of the author of this world, and to bring back wandering fouls to God. This celeftial meffenger was attacked by the prince of darknefs, and by the god of the Jews, but without effect; fince, having a body only in appearance, he was thereby rendered incapable of fuffering. Thofe who follow the directions of this celeftial conductor, mortify the body by faftings and aufterities, and renounce the precepts of the god of the Jews, and of the prince of darknefs, fhall, after death, afcend to the manfions of felicity and perfection. The rule of manners which Marcion prefcribed to his followers was exceffively auftere, containing an exprefs prohibition of wedlock, wine, flefh, and all the external comforts of life. See MANICHÆANS.

Marcion denied the real birth, incarnation, and paffion of Jefus Chrift, and held them to be all apparent only. He denied the refurrection of the body; and allowed none to be baptized but thofe who preferved their continence; but thefe, he granted, might be baptized three times.

In many things, he followed the fentiments of the heretic Cerdon, and rejected the law and the prophets. He pretended the gofpel had been corrupted by falfe prophets, and allowed none of the evangelifts but St. Luke, whom alfo he altered in many places, as well as the Epiftles of St. Paul, a great many things in which he threw out. In his own copy of St. Luke, he threw out the two firft chapters entire.

Some ancient writers fay, that the Marcionites held, as above ftated, two gods, one good, the other evil; but, as at other times they reprefent them, calling one good, the other a judge, or fevere: this muft be their meaning. Jerom fays, that Marcion taught Jefus to be the fon of the good God, that is, not of the fame God fpoken of in the prophets, who is there reprefented as cruel, righteous, juft, a judge, and the like. To the fame purpofe is the reprefentation of Clement of Alexandria, upon whofe teftimony we may rely. The Marcionites fay, that nature, or the world, is evil, becaufe it is made of matter, which is evil in itfelf; and that the world was made by the Creator, who is juft. They are, therefore, fpoken of as having but low thoughts of this world on account of its being very imperfect, and not worthy of the Supreme Deity; and yet, as Tertullian fays, they refpected the Creator. The Marcionites feem to have been led into their erroneous notion of dividing the Deity from refpect to his attributes. For they thought, if a good God had made the world, he would have excluded from it fin and mifery, and that all men would have been both holy and happy. Their reafonings upon this point are given by Tertullian, as well as fome other arguments, deduced from the law, and other parts of the Old Teftament, to prove the being from whom that was derived, different from the fupreme or good God. Although, in fome inftances, they feem to blame juftice, denominating it feverity, and reprefenting it as inconfiftent with the character of goodnefs in God; and for this reafon feigning to themfelves another God, different from the Creator, a God of unmixed goodnefs; yet they allowed there would be a future judgment. But then the Creator was to be the judge, whofe juftice they reprefented to be fo ftrict as to approach near to feverity. It feems alfo to appear from the teftimony of Tertullian, and fome other evidence, that the Marcionites did not allow the freedom of human actions, but were believers in a kind of neceffity. They thought that the virtuous would be put into poffeffion of eternal happinefs after their departure out of this world, and that the place of their enjoyment would be where the prefence of the good God was, and where Chrift their faviour fhould alfo refide; but they did not allow that the body would be a partaker of this happinefs, or at leaft they denied the refurrection of the fame body; for which reafon they are cenfured by Tertullian. According to the account given by

Epiphanius,

Epiphanius, if we may depend upon it, Marcion taught the tranfmigration of fouls from one body to the other; but this is contradicted by a paffage in Clemens Alexandrinus, which implies that this was not the opinion of the Marcionites. According to Irenæus, Marcion taught that when Chrift defcended into hell, he delivered many wicked people, but left there the patriarchs, and many other good men of the Old Teftament. Upon this ftatement Beaufobre has made many pertinent and juft obfervations.

Marcion was fo far from believing that our Saviour was born of a virgin, that he did not allow he was born at all. He thought the Son of God affumed the exterior form of a man, and appeared as a man; and that, without being born, or gradually growing up to the full ftature of a man, he fhewed himfelf at once in Galilee, as a man grown. His gofpel of St. Luke, it is thought, began with thefe words, "In the 15th year of Tiberius, God defcended into Capernaum, a city of Galilee." And the Marcionites alfo fuppofed, that at the firft moment of his appearance in this world, he was completely fitted for entering on his great work, and that he immediately affumed the character of a Saviour. Although Marcion acknowledged Jefus to be Chrift, he denied his being the Chrift foretold by the Jewifh prophets. The deliverer promifed to the Jewifh nation was not, as he pretended, the Son of God; nor did the oracles of the Old Teftament agree to Jefus Chrift. Marcion, fays Tertullian, was a believer in two Chrifts, one who appeared in the time of Tiberius, for the falvation of all nations; and another the reftorer of the Jewifh ftate, who is yet to come. Marcion allowed the truth of our Saviour's miracles, and thought them a fufficient foundation for believing in him. His doctrine concerning our Saviour was, that, from love to the human race, and for their fake he defcended into this world, and fubmitted to great humiliations. Although, as his followers did not acknowledge him to have had real flefh, it may be fuppofed that they did not allow him to have really fuffered, yet they believed that he was betrayed by the Jews, at the inftigation of their God the Creator, and that he died and was buried. They even faid that the death of the Meffiah was neceffary for the falvation of man, though they did not fuppofe it to be an expiatory facrifice. They muft, likewife, have believed our Lord's refurrection. From various teftimonies, and from the arguments alleged by Tertullian, it appears that the Marcionites believed the whole hiftory of our Saviour's appearance in a human form, and of his death on the crofs. They alfo believed that he was crucified between two malefactors: they moreover allowed the truth of the miraculous earthquake and darknefs at the time of his crucifixion. They acknowledged his having twelve apoftles, and that one of them was a traitor. They alfo admitted the reality of the appearance of Mofes and Elias on the mount, and of that voice from heaven which faid, "This is my beloved Son, hear him."

Their manners, as we have already faid, were ftrictly virtuous. Tertullian hints, that none were admitted by them to baptifm and the eucharift, the obligation of which inftitutions they allowed, unlefs they had taken an oath againft having any children, as if they meant it againft the Creator; and Clement fuppofes that they abftained from marriage, that they might not people the world of the Creator, and that they offered themfelves voluntarily to martyrdom out of hatred to the Creator. On the fabbath, or feventh day, they fafted, becaufe it had been a day of reft to the Creator, or God of the Jews, whom they defpifed. They permitted women to baptize, and they repeated baptifm feveral times upon the fame perfon, if he happened to commit any fin after this rite had been adminiftered to him; and at the eucharift they ufed only water in the cup. They had among them churches for the ftated performance of public worfhip.

The Old Teftament was altogether fet afide by Marcion, under the notion that it proceeded from the Creator, who, in his eftimation, was deftitute of goodnefs, and the author of all that fin and mifery which fubfift in the world: and his followers agreed, that the law and the gofpel could not come from the fame being, becaufe there are, in their opinion, feveral things contained in the former inconfiftent with many in the latter. They objected to the appointment of facrifices, and to the diftinction of meats into clean and unclean; and they were difpleafed with the order given to the Jews, to fpoil the Egyptians. Tertullian fays, that they alleged fuch and fo many objections againft the law and the prophets, that they feemed more like the objections of Heathens than of perfons who embraced Chriftianity, though ever fo heretical in their notions. Their averfion to the Old Teftament was fo great, that on this account they mutilated many paffages in the New, even in thofe books which they admitted; rejecting all which related to the law and the prophets, or which were quoted from them, as plainly foretelling the coming of Jefus Chrift, and which fpoke of his Father as the Creator of the world. Confidering this Creator, or God of the Jews, as of a character very different from the good God or Father of our Lord Jefus Chrift, they afferted that Chrift came to deftroy the law given by him, becaufe it was oppofite to the gofpel.

Marcion received but eleven books of the New Teftament, and thofe were ftrangely curtailed and altered. He divided them into two parts, calling the one the Gofpel, and the other the Apoftolicon. The former contained only one of the four gofpels, *viz.* that of St. Luke, and this was mutilated and altered, and interpolated in a great variety of places. Not allowing it to be called the gofpel of St. Luke, he retrenched the firft and fecond chapters entirely, and began his gofpel at the firft verfe of the third chapter, and this verfe he read in a different manner from our copies, as we have already obferved. He rejected the genealogy and baptifm of our Saviour; and it, therefore, feems not unlikely that he connected that part of the firft and fecond verfes of the third chapter which he retained, with the 31ft verfe of the fourth chapter. He alfo rejected the hiftory of the Temptation, becaufe he would not attribute too much of human weaknefs to our Saviour; and the other ftory contained in the fourth chapter of Chrift's going into the fynagogue, at Nazareth, and reading out of the prophet Efaias, was alfo rejected. This they expunged with the whole that follows it to the end of the 30th verfe. But it would be tedious to enumerate all the alterations, or omiffions, or interpolations, which Marcion and his followers made in the gofpel of St. Luke. They are recited from Epiphanius by Dr. Lardner. We may obferve, however, that a fufficient number of paffages remain even in the copies of the Marcionites, to eftablifh the reality of the flefh and blood of Chrift, and to prove that the God of the Jews was his Father, and a being of confummate goodnefs. Marcion rejected the Acts of the Apoftles from his canon of the New Teftament; his Apoftolicon confifting of ten of the epiftles of St. Paul. The reafon why he rejected this book is very obvious, according to Tertullian, becaufe from it we can plainly fhew, that the God of the Chriftians, and the Creator, or God of the Jews, were the fame being; and that Chrift was fent by him, and by no other. The ten epiftles of St. Paul, admitted by Marcion, are much altered. Thofe which he receives, in a very

mutilated

mutilated ſtate, are the epiſtles to the Galatians, the firſt and ſecond to the Corinthians, that to the Romans, the firſt and ſecond to the Theſſalonians, and that to the Epheſians, which he calls the epiſtle to the Laodiceans, and thoſe to the Coloſſians, to Philemon, and to the Philippians. After all it is juſtly obſerved by Lardner, that the teſtimony even thus afforded in favour of the books of the New Teſtament is very ſtrong. "By means of this heretic's rejecting ſome books entirely, and mutilating others, the ancient Chriſtians were led to examine into the evidence for theſe ſacred writings, and to compare copies together, and on this account to ſpeak of whole books, and particular paſſages, very frequently in their works; which hath enabled us of later ages to authenticate theſe books, and to come at the genuine reading of many texts, in a better manner than we could otherwiſe have done." Lardner's Works, vol. ix. Moſheim's Eccl. Hiſt. vol. i.

MARCITES, Marcitæ, a ſect of heretics in the ſecond century, who alſo called themſelves the *perfecti*, and made profeſſion of doing every thing with a great deal of liberty, and without any fear.

This doctrine they borrowed from Simon Magus, who, however, was not their chief; for they were called Marcites, from one Marcus, who conferred the prieſthood, and the adminiſtration of the ſacraments, on women.

MARCK, in *Geography*, a town of Pruſſia, in Pomerelia; 12 miles S.E. of Marienburg.

MARCKLOE, a town of Pruſſia, in the province of Bartenland; ſix miles N. of Raſtenburg.

MARCKOLSHEIM, a town of France, in the department of the Lower Rhine, and chief place of a canton, in the diſtrict of Barr; 23 miles S. of Straſburg. The place contains 3996, and the canton 15,644 inhabitants, on a territory of 92½ kiliometres, in 13 communes. N. lat. 48° 11'. E. long. 7° 33'.

MARC-LAJAILLE, St., a town of France, in the department of the Lower Loire, and chief place of a canton, in the diſtrict of Ancenis. The place contains 1509, and the canton 5235 inhabitants, on a territory of 160 kiliometres, in ſeven communes.

MARCLISSA, a town of Luſatia, near the confines of Sileſia; 15 miles S.E. of Gorlitz.

MARCO, St., a town of Naples, in the province of Otranto; five miles N. of Lecce.—Alſo, a town of Naples, in Principato Citra; 12 miles N.N.E. of Benevento.—Alſo, a town of Naples, in Capitanata; eight miles N. of Monte St. Angelo.—Alſo, a town of Naples, in Calabria Citra, the ſee of a biſhop, eight miles W.N.W. of Biſignano.—Alſo, a town of Spain, in Galicia; 30 miles N.N.W. of Mondonedo.—Alſo, a town of New Navarre; 45 miles S.E. of Caſa Grande.—Alſo, a town of Italy, in Friuli; nine miles W. of Udina.—Alſo, a town of Sicily, in the valley of Demona; 15 miles W. of Patti.—Alſo, a ſmall iſland near the coaſt of Iſtria. N. lat. 44° 4'. E. long. 13° 53'.—Alſo, a river of Eaſt Florida which runs into the Atlantic, N. lat. 30° 3'. W. long. 81° 40'.

MARCOING, a town of France, in the department of the North, and chief place of a canton, in the diſtrict of Cambray. The place contains 1175, and the canton 14,957 inhabitants, on a territory of 212½ kiliometres, in 20 communes.

MARCOSIANS, or Colarbasians, an ancient ſect in the church, making a branch of the Valentinians.

St. Irenæus ſpeaks at large of the leader of this ſect, Marcus, who, it ſeems, was reputed a great magician. Maſſuet computes that Marc appeared about the year 160. Baſnage, on the authority of Euſebius, who underſtood Irenæus to ſay that Marc appeared about the ſame time with Valentinus, ſpeaks of him at the year 127. Many learned moderns are of opinion, that Marc belonged to the Valentinian ſchool, and they formed this opinion on the teſtimonies of Irenæus and Tertullian. Nevertheleſs Rhenford and Beauſobre ſay, that the Marcoſians were Jews, or judaizing Chriſtians; and Grabe likewiſe owns that they were of Jewiſh extract. Irenæus leads us to imagine that Marc, who was an Aſiatic, had come into Gaul, and made many converts there. Nevertheleſs, learned moderns think, that they were only diſciples of Marc, who came into that country where Irenæus reſided, of whom, in one place, he makes particular mention. Irenæus repreſents him as exceedingly ſkilful in all magical arts, by means of which he had great ſucceſs. Tertullian and Theodoret concur in calling Marc a magician. Irenæus, after giving an account of the magical arts of Marc, adds, that he had, probably, an aſſiſting demon, by which he himſelf appears to propheſy, and which enabled others, eſpecially women, to propheſy likewiſe; this practice favoured his ſeduction of many females, both in body and mind, which gained him much wealth. He is alſo ſaid to have made uſe of philters and love-potions, in order to gain the affections of women, and his diſciples are charged with doing the ſame. Dr. Lardner, with his uſual candour and impartiality, ſuggeſts ſome doubts as to the juſtice of theſe accuſations, with his reaſons for queſtioning their truth.

The Marcoſians are ſaid to have placed a great deal of myſtery in the letters of the alphabet, and thought that they were very uſeful in finding out the truth. They are charged unjuſtly with holding two principles, and as if they were Docetæ, and denied the reſurrection of the dead; for which there is no ſufficient evidence. They perſiſted in the practice of baptiſm and the euchariſt. As to their opinion concerning Jeſus Chriſt, they ſeem to have had a notion of the great dignity and excellence of his perſon, or his ineffable generation: and, according to them, he was born of Mary, a virgin, and the word was in him. When he came to the water, the ſupreme power deſcended upon him; and he had in him all fulneſs; for in him was the word, the father, truth, the church, and life. They ſaid that the Chriſt, or the Spirit, came down upon the man Jeſus. He made known the Father, and deſtroyed death, and called himſelf the Son of Man; for it was the good pleaſure of the Father of all that he ſhould baniſh ignorance and deſtroy death: and the acknowledgment of him is the overthrow of ignorance. From the account of Irenæus, we may infer that the Marcoſians believed the facts recorded in the goſpels, and that they received moſt, or all the ſcriptures of the Old and New Teſtament. Irenæus alſo ſays, that they had an innumerable multitude of apocryphal and ſpurious writings, which they had forged: and that they made uſe of that fiction concerning the child Jeſus, that when his maſter bade him ſay, alpha, the Lord did ſo: but when the maſter called him to ſay beta, he anſwered, "Do you firſt tell me what is alpha, and then I will tell you what beta is." As this ſtory concerning alpha and beta is found in the goſpel of the infancy of Jeſus Chriſt, ſtill in being, ſome are of opinion, that this goſpel was compoſed by the Marcoſians. Lardner's Works, vol. ix.

MARCOTZI, in *Geography*, a town of Sclavonia; 20 miles N.E. of Kralovavelika.

MARCOUF, St., two rocky iſlands in the Engliſh Channel, near the coaſt of France, about nine miles S.E. of La Hogue. The ſurface of each iſland, which is 18 or 20 feet above the ſurface of the ſea at high water, compriſes about an acre. They were taken poſſeſſion of in 1795, 1795, by fir Sidney Smith; and, in the following year, block-houfes, with detachments of marines, invalids, and 12 artillery men, were ordered out by government. In the year 1798, the French difpatched a very numerous body of troops on board 52 gun-veffels, in order to recover thefe iflands; but after having made a vigorous attack, they were compelled to retreat to La Hogue, with the lofs of 1100 killed, drowned, and wounded; but on the fide of the Britifh only one killed, and two wounded. N. lat. 49° 31′. W. long. 1° 4′.

MARCOUSSIS, a town of France, in the department of the Seine and Oife; 15 miles S. of Paris.

MARCULUS, among the Romans, a knocker, or inftrument of iron to knock at the doors with.

MARCUS HOOK, in *Geography*, a place of America, in Chefter county, Pennfylvania, on the W. fide of Delaware river; 20 miles below Philadelphia, containing about 30 families. Here are two rows of piers, or long wharfs, for defending veffels from the driving of ice in winter.

MARCZA, a town of Auftrian Poland; 16 miles S. of Halicz.

MARD LE BLANC, ST., a town of France, in the department of the Ille and Vilaine; feven miles W. of Fougeres.

MARD, *St.*, or *St. Medard*, a town of France, in the department of the Forefts; 33 miles W. of Luxemburg.

MARD *fur le Mont, St.*, a town of France, in the department of the Marne; 12 miles S. of St. Menehould.

MARDS *en Othe*, a town of France, in the department of the Aube; 13 miles S.W. of Troyes.

MARDAC, in the *Materia Medica of the Ancients*, a name given by fome to litharge. The Arabian writers have fometimes called it by this name, and fometimes by that of *mardefengi*. Many of their commentators have thought that they meant two different fubftances by thefe two names; but it does not appear to be truly the cafe, the two words ftanding, in different writers, for the fame thing. Avicenna has given us a chapter on *mardus*, in which he has tranflated the chapter of Diofcorides on litharge: and Serapion has given us a chapter on the *mardefengi*, in which he has given us an account of the fame fubftance, under the terms that Galen ufes for the defcription of litharge, and even quotes him for the account.

MARDAITES, in *Ecclefiaftical Hiftory*. See MARONITES.

MARDICK, in *Geography*, a fmall town, or rather village, of France, in the department of the North, fituated near the coaft of the Englifh Channel; three miles S.W. of Dunkirk. This place was once famous for its canal, conftructed after the peace of Utrecht, by order of Louis XIV. This canal, 3338 toifes and two feet in length, commenced at the canal of Bergues, near Dunkirk, and extended with a breadth of between 25 and 30 toifes, no lefs than 1500 toifes from E. to W. in length, and then winded from S. to N., and at the diftance of 300 toifes farther it had a fluice with two bafins in it, one of which was 44 feet broad, for the reception of large veffels, and the other 26 feet broad, for the accommodation of thofe that were fmall. It afterwards extended ftill farther to the main fea. Many of the works conftructed in this canal were deftroyed in confequence of a treaty with England in the year 1717, and no others were to be erected on that coaft within fix miles of Dunkirk and Mardick.

MARDJE, a town of Egypt, fituated on a fpot abounding with palm trees; fix miles N.E. of Cairo.

MARDIKERS, or TOPASSES, a breed of Dutch, Portuguefe, Indians, and other natives, incorporated with the Dutch, at Batavia, probably deriving their name from Mardick, or Mardika, the fubject of the above article. As the Dutch adventurers formed the leading party when Batavia was taken poffeffion of, the natives attached the appellation to all perfons of European defcent or connection.

MARDIN. See MERDIN.

MARE, NICHOLAS DE LA, in *Biography*, was born about the year 1641, and was, in after life, a commiffioner of the Chatelet during the fpace of forty years. In confideration of his great zeal in the king's fervice, he was made fteward of the houfhold of the count of Vermandois, and after the death of that prince, he had a penfion for his life. He was employed in various important commiffions relative to the revenue, and made feveral journies to the provinces on public occafions, in which he acquitted himfelf to general fatisfaction. He died in 1723, and was author of a work of high merit, entitled "Traitè de la Police," 3 vols. folio, 1705—19. This contains a detailed account of the eftablifhment of the police in France; the functions and prerogatives of its magiftrates, its regulations, &c. A fourth volume was added in 1738, by M. le Clerc de Brillet. Moreri.

MARE, PHILIBERT DE LA, a literary character, and counfellor of the parliament of Dijon, who flourifhed in the 17th century. He was author of feveral works in the Latin language, taking that of De Thou as an example, which were well received by the public. The chief of thefe is entitled "Commentarius de Bello Burgundico apud Sequanos," containing a relation of the war of 1636. In a fecond edition by his fon Philip, in 1689, is given a catalogue of writers on the hiftory of Burgundy. M. Mare compofed a number of biographical fketches, chiefly of literary characters, and he left in MS. Memoirs of the public tranfactions from the year 1673, to his death. Moreri.

MARE, in *Rural Economy*, the female of the horfe kind of animal. Mares intended for the purpofe of breeding, fhould be felected with great care and attention, fo as to be as free as poffible from faults or imperfections in their forms, and be well fuited in their kind to the purpofes for which they are defigned. The practice of making ufe of fuch mares as may happen to be on the farm fhould never be adopted, as it is prejudicial to the raifing of good horfe ftock. The particular directions regarding the kinds of horfes to be bred, are thefe: if for the manege, or pads, the mares fhould have their heads well fet on, and their breafts broad; their legs not too long, their eyes bright and fparkling, and bodies large enough, that the foal may have room to lie in their belly. They fhould be of a good and gentle difpofition, and their motions eafy and graceful: the more good qualities the mares have, the better, in general, the colts will prove.

If the owner would breed for racing, or for hunting, the mares muft be chofen lighter, with fhort backs and long fides; their legs muft be longer, and the breaft not fo broad; and fuch fhould always be chofen as have good blood in their veins. If the fpeed and wind of any particular mare have been tried, and found good, there is the more certainty of a good colt from her: but fhe fhould be in full health and vigour at the time, and not above feven years old, or eight at the utmoft. The younger the breeders are, the better, in general, the colts will be.

Mares may be put to the horfe when three years old, but it is a better practice to defer it a year longer, where it can be done with convenience. Some advife mares to be kept in the

the houfe fome time before they are put to the horfe, but this feems of little confequence when they are in proper health.

The beft feafon for putting mares to the horfes is in the fpring, about April or May, in order that the foals may be dropped fufficiently early, which is of confequence in their rearing afterwards.

The length of time that they ufually go with foal is about eleven months, which is a circumftance that fhould be kept in the mind of the breeder, though there are often confiderable deviations. Mares fhould always be kept well while in foal, in order to have a fine healthy offspring.

The cuftom of performing much work with the mares while in foal is improper, as being attended with danger, as well as liable to check the growth of the foals: when this is practifed with farm mares, they fhould only be gently wrought, and that with great care and attention. See Horse.

Mare, in *Geography*, a fmall ifland near the W. coaft of Scotland. N. lat. 56° 14'. W. long. 5° 45'.

MAREB, a river of Africa, which rifes in Abyffinia, about fixty miles N.E. of Axum, and joins the Tecazzé, in the country of Nubia, 100 miles before its junction with the Nile.

Mareb, a town of Arabia, in the province of Yemen, and capital of the diftrict of Bellad es Scheref. Its fheriff poffeffes this town with fome adjacent villages. The town confifts of only about 300 poor houfes; fituated 16 leagues N.E. of Sana. It was known to the ancients by the name of "Mariaba," as the capital of the Sabæans; and in its vicinity are ruins, pretended to be the remains of the palace of queen Balkis. The Sabæans had a famous refervoir for water, called by the Arabs "Sitte Mareb," which was a narrow valley between two ranges of hills, and a day's journey in length. Six or feven fmall rivers meet in that valley, fome of which contain fifh, and their waters flow through the year; but others are dry, except in the rainy feafon. For confining the waters in this feafon, the entrance into the valley was fhut up by a high and thick wall, and as outlets through which the water thus collected might be conveyed, in the time of drought, for watering the neighbouring fields, three large flood-gates were formed in the wall, one above another. The wall was 50 feet high, and built of large hewn ftones. Its ruins are ftill vifible. The tradition that the city of Mareb was deftroyed by a deluge, occafioned by the fudden burfting of the wall, is fabulous. This accident, however, proved fatal to the city, by rendering the neighbouring fields wafte and barren, fo that it was thus left without the means of fubfiftence. The prince who formerly reigned over Mariaba was a powerful prince; but Mareb is now the abode of a poor fheriff, who is hardly able to withftand the encroachments of feeble neighbours. Niebuhr.

MARECA, in *Ornithology*, the name of a Brafilian fpecies of duck, much valued there at table. It is of the fhape of our duck; its head is grey, but has a beautiful red fpot on each fide, at the infertion of the beak, and a whitenefs in the lower part under the eyes; its breaft and belly are of the colour of frefh-cut oak, variegated with black fpots; its legs and feet are black; its tail grey; and its wings elegantly variegated with grey and brown; but they have in the middle a large mixture of that gloffy green, which we fee in the necks of our drakes. There is, befides this, another fpecies of the mareca, which is of a dufky olive-coloured brown on the back, white on the throat, and grey on the breaft and belly, and very remarkable for the fine bright red colour of its feet. See Duck.

MARECHAL. See Marshal.

MARECHAUX, Cape, in *Geography*, a cape which forms the north-eaft fide of the bay of Jacmel in St. Domingo. N lat. 18 18'.

MARECHITES, a denomination of Indians, who inhabit the banks of the river St. John, and around Paffamaquaddy bay, in North America. To this clafs of Indians belong about 140 fighting men.

MARECKAN, one of the fouthern Kurile iflands, in the North Pacific ocean, about 30 miles long, called by the Ruffians "Chimouchis." N. lat. 47 5'. E. long. 152° 50'.

MAREGORIAN, one of the Molucca iflands, about 15 miles long and 5 broad. S. lat. 0° 36'. E. long. 127° 18'.

MAREILLAC, a town of France, in the department of Aveyron, and chief place of a canton, in the diftrict of Rodès. The place contains 1216, and the canton 10.453 inhabitants, on a territory of $252\frac{1}{2}$ kiliometres, in 18 communes.

MARELLA, a town of Hindooftan, in the Carnatic; 21 miles S.S.W. of Ongole.

MAREMMES, Les, a diftrict of the Sienna, in Etruria, divided into Maremma di qua, and Maremma di la; the former on the eaft, the latter on the weft fide of the river Ombrone; both bounded by the fea on the fouth. The foil is fertile, but the air is reckoned unwholefome.

MARENA, in *Ichthyology*. See Salmo *Marænula*.

MARENGO, in *Geography*, one of the fix departments into which Piedmont was divided, after it was united to the French republic, Aug. 26, 1802: it is compofed of Montferrat, Alexandria, Tortoneze, and Laumelline, and is bounded on the north by a part of Italy and the department of the Sefia, on the eaft by Parma, on the fouth by Genoa, and on the weft by the departments of the Tanaro and Doire. This department lies in N. lat. 44 50', and contains 181 fquare leagues, and 231,954 inhabitants. It is divided into five circles or diftricts, *viz.* Cafal, containing 108,926 inhabitants; Alexandria, 76,081; Voghere, 67,293; Bobbio, 21,288; and Tortone, 48,366. This department, lying between the Po and the Ligurian republic, is hilly, but fertile, yielding all forts of grain, fruits, wine, and excellent paftures. There are iron mines in the vicinity of Serravalle. This department derives its name from that of a village, four miles eaft of Alexandria, which was rendered famous by a fevere and fanguinary battle fought there June 14th 1800, that terminated in fubjecting Piedmont and Lombardy to the dominion of the French. This battle was commenced by the Auftrians, who compelled the centre of the French army, though ably fupported, to fall back. The Auftrians advanced upon Marengo with a movement that produced dreadful carnage, and gaining frefh reinforcements, they took poffeffion of the village; part of the centre of the French having given way, and fled in diforder from the field of battle. The right wing, thus infulated, was attacked by two lines of infantry, which marched againft it with a formidable artillery; and the retreat of the centre obliged it, after vigorous refiftance, to follow the fame movement. Nothing could fave the French army, in thefe defperate circumftances, but the body of referve under general Defaix, which was not yet ready for action; Buonaparte, in order to gain time, having retarded its movement. The retreat of the French was made under the fire of 80 pieces of artillery; and though the

carnage

carnage was horrible, they kept their ranks, and inftantly replaced thofe who fell with frefh troops.

Victory now feemed to declare in favour of the Auftrians, whofe numerous and excellent cavalry covered the plain, fupported by feveral fquadrons of light artillery, and threatened to turn the army. At this critical moment, the grenadiers of the confular guard marched to fupport the right, which was the only column that had held firm. They advanced, and like a wall of granite, as they were called at the time, fuftained three fucceffive charges. At the fame inftant, Monnier's divifion, which formed part of the corps de referve, was ordered to attack the battalions which protected the Auftrian cavalry, part of which was purfuing the centre and left of the French. On the plain of St. Juliano, the referve under Defaix was drawn up in two lines, fupported on the right and left by the artillery under Marmont, and by the cavalry under Kellerman. Behind this corps the fugitives of the centre and left formed : and the prefence of Buonaparte, who flew from rank to rank, reanimated the foldiers, and at four in the afternoon, the battle which had raged for feven hours was about to recommence. The Auftrians, apprehending themfelves fure of victory, after having routed two-thirds of the French army and ready to furround the remainder, had not taken any account of a divifion that had not yet been attacked. They had therefore improvidently wafted their ftrength, and fcattered their battalions in the ardour of purfuit. Buonaparte perceived the advantages which this ardour on the part of the enemy had given him. Defaix, at the head of his legion, rufhed forward with impetuofity among the victorious battalions, charging them with the bayonet ; the remainder of the divifion followed this movement, and the whole army, catching the enthufiafm, advanced at the pas-de-charge. The Auftrians, overwhelmed with aftonifhment at this fudden explofion, withdrew their artillery, and the infantry began to give way. At this critical moment Defaix fell ; but the lofs of this brave officer, inftead of difconcerting, roufed the ardour of the troops into a fury, in order to avenge his death ; but the bayonet, which had driven back the firft line of the Auftrians, could not pierce the fecond. The refiftance of the Auftrians ftopping the French in their career, rendered the event of the day ftill doubtful ; but its fate was decided by Gen. Kellerman, who, ordering a charge of cavalry, threw the Auftrians into diforder, and made a whole divifion prifoners, to the number of 6000 men, among whom were feveral generals, and almoft all the officers of the ftaff. A third line of infantry yet remained as a corps de referve, fupported by the reft of the artillery, and the whole of the cavalry. Againft this laft divifion the right wing of the French advanced with the grenadiers of the confular guard, and part of the referve under Baudet, and fupported by the artillery under the command of Marmont. The Auftrian line ftill maintained its ground ; but the French cavalry under Murat, having charged the Auftrian cavalry, this latter gave way precipitately, and was completely routed ; fo that night fcarcely put a ftop to the purfuit and carnage. The French boaft of having wounded, killed, and taken prifoners, 15,000 men ; the victory on their part, it muft be acknowledged, was fignal, but their lofs was probably equal to that of the army with which they contended. Many traits of heroifm were exhibited on occafion of this battle, and many confequences refulted from it which will render it memorable in the page of hiftory. Cruttwell.

MARENNE, a town of France, in the department of the Stura ; 4 miles N.N.E. of Savigliano.

MARENNES, a town of France, and principal place of a diftrict, in the department of the Lower Charente, at the mouth of the Seudre ; 9 miles S.S.W. of Rochefort. The place contains 4633, and the canton 9950 inhabitants, on a territory of 215 kiliometres, in fix communes. The principal article of its trade is falt. N. lat. 45° 49'. W. long. 1° 1'.

MARENZIO, Luca, in *Biography*, an eminent and favourite Italian mufical compofer, who flourifhed during the latter end of the fixteenth century. This ingenious and fertile author, who diftinguifhed himfelf chiefly as a madrigalift, was born at Concaglia, in the diocefe of Brefcia, and the fcholar of Giovanni Contini, who was himfelf a voluminous compofer: having, in 1565, publifhed Cantiones, 6 vocum ; Introitus et Halleluja, 5 vocum, for feftivals : Hymnos, 4 vocum ; Threnos Hieremiæ, 4 vocum, for Paffion-week ; and a Miferere, in four parts.

The inclination of his difciple Marenzio leading him very early to the compofition of madrigals, he cultivated that ftyle more fuccefsfully than any of his predeceffors, and the number he compofed is prodigious. At Venice, between the years 1587 and 1601, were printed nine books of his madrigals, for five voices ; the two laft were pofthumous. Befides thefe, this author compofed fix books of madrigals, in fix parts. Madrigals for three voices ; another fet for five, and ftill another for fix voices, different from all the former. Canzonets for the lute. Motetti, a 4, & Sacras Cantiones, 5, 6, ac 7 Vocibus modulandus. All thefe works were firft printed at Venice ; and afterwards at Antwerp, and many of them in London, to Englifh words ; fee "Mufica Tranfalpina," two books, and a collection of Italian madrigals, with Englifh words, publifhed in 1589, by Thomas Watfon. Quadrio, t. ii. p. ii. p. 324, gives a long lift of his Villanelle, a 3 voci ; and Draudius, p. 1614, of his motets, a 4, for all the feftivals throughout the year. Ven. 1588. Et ejufd. Completorium & Antiphone, a 6, 1595.

Of the madrigal ftyle he was called in Italy, *il piu dolce Cigno;* and the proud antagonift of Nanino, Sebaftian Raval, the Spaniard, who was editor of fome of his works, ftyles him a *divine compofer*. He was fome time maeftro di capella to cardinal Luigi d'Efte ; and, according to Adami and others, careffed and patronifed by many princes and great perfonages, particularly the king of Poland and cardinal Cinthio Aldobrandini, nephew to pope Clement VIII. Upon his return to Rome, after quitting Poland, he was admitted into the pope's chapel, and dying in that city, 1599, he was buried in the church of St. Lorenzo, in Lucina. Adami Offerv. per ben regolar il Coro Pontif.

Our countryman, Peacham, in his Complete Gentleman, fpeaks of his delicious *aire* and fweet invention in madrigals ; and fays, "that he excelled all other whatfoever, having publifhed more fets than any author elfe, and hath not an ill fong." Adding, that "his firft, fecond, and third parts of Thyrfis, 'Veggio dolce il mio ben, &c.' are fongs the Mufes themfelves might not have been afhamed to have compofed." To all this we can readily fubfcribe, and will not difpute his ftature, or the colour of his hair, when he further tells us, that "he was a little black man," but where he afferts that "he was organift of the pope's chapel at Rome a good while," he lofes all credence with us ; as there never yet was an organ in the papal chapel ; nor is it likely, however great his mufical merit may have been, that the niece of any reigning pope could have been fent for to Poland, with fo little ceremony, as he tells us, in the character of a lutenift and finger, in order to gratify the curiofity of his

his Polish majesty, and the affection of Luca Marenzio. Indeed, the whole account favours of hear-say evidence and absurdity; and is so much the more incredible, as no other musical writers, who were eager to record every memorial they could procure concerning Luca Marenzio, have ventured to relate these circumstances.

There are no madrigals so agreeable to the ear, or amusing to the eye, as those of this ingenious and fertile composer. The subjects of fugue, imitation, and attack, are traits of elegant and pleasing melody; which, though they seem selected with the utmost care for the sake of the words they are to express, yet so artful are the texture and disposition of the parts, that the general harmony and effect of the whole are as complete and unembarrassed as if he had been writing in plain counterpoint, without poetry or contrivance.

The first set of his madrigals for five voices, however, seems the most elaborate; the fugues and imitations here are more ingenious and frequent than in his other works. He has, indeed, in those of later date more melody; but as yet there was too little to compensate for the want of contrivance. Whoever takes the trouble to score and examine this set, will discover marks of real genius with respect to harmony and modulation, with many attempts at melody of a more graceful kind than is to be found in the works of his contemporaries: as we may reasonably conclude this to have been one of his early productions, of nearly the middle of the sixteenth century.

We have never met with more than one entire movement, in *triple time*, among all the works of this excellent composer; and that is in the eighth set for five voices, "La mia Clori e brunetta." In a collection of his madrigals for six voices, published at Antwerp, 1594, some of the movements are gay and spirited, and contain passages that continued in fashion more than a hundred years after publication, as appears by the use that Purcell and Handel have made of them; and indeed there are others which modern Italians have not disdained to adopt.

The words of his ninth book of five-part madrigals are all from the Canzoniere of Petrarca, and of these the composition seems the most free and fanciful of all his works.

Though the madrigals of the sixteenth century appear now so grave as to be scarcely distinguishable from the music of the church, yet the masters of that period had very distinct and characteristic rules for composing in both styles. Pietro Pontio, who had himself produced many that were excellent, in giving instructions for composing madrigals, says, that "the subjects of fugue and imitation in them should be short, and the notes of a quicker kind, and more syncopated than in church music; otherwise they would not be madrigals. The parts likewise should frequently move together; but the greatest care should be taken to express the sense of the words as exactly as musical imitation will allow, not only by quick and slow passages, or notes ascending and descending occasionally, but by modulation, which, when the sentiment of the poet implies harshness, cruelty, pain, sorrow, or even joy, pleasure, or the like, will assist the expression more than single notes." Here he refers to the fourth madrigal of Orlando di Lasso (book i) for an example of the happy expression of words. Though composers were now very timid in the use of flats, sharps, and transposed keys, yet licences were taken in madrigals which were inadmissible in music *à capella*. In the eighth madrigal of Luca Marenzio's ninth book, *a 5*, *Solo e pensoso*, a bold and curious composition, the upper part ascends from the key-note G to A, the ninth above by a series of fifteen semitones, and then descends from A to D by the same intervals. The answer to subjects proposed in madrigals were more imitations than regular replies, according to the strict laws of fugue; yet, with respect to the melody of the short passages or musical sentences which were used, and the harmony with which they are accompanied, great pains seem to have been taken in polishing both. Indeed, as this was the chief music of the chamber, where it is probable the critics and lovers of music attended, for neither public concerts nor operas had as yet existence, there can be no doubt but that every refinement was bestowed on this species of composition, which the ideas of musical perfection could then suggest.

MAREOTIS, in *Geography*, a lake of Egypt, S. of Alexandria, which is become almost dry, though occasionally, as it is said, moistened by inlets from the sea. This lake, says Savary, whose banks were covered with papyrus and date-trees, is no longer in existence, because the Turks have neglected to preserve the canals which conveyed the waters of the Nile. Belon, who travelled in Egypt some years after the conquest of the Ottomans, assures us, that in his time lake Mareotis was only at half a league's distance from the walls of Alexandria, and that it was surrounded by forests of palm-trees. "At the moment of my writing, (says the same traveller,) it is entirely occupied by the sands of Lybia. These deplorable changes must be attributed to the destructive government of the Turks." See ALEXANDRIA.

MARESIGO, a town of Istria; four miles S. of Capo d'Istria.

MARETIMO, an island of the Mediterranean, near the W. coast of Sicily, about 22 miles in circumference, containing a chateau and some farms, 15 miles W. of Trapani. N. lat. 38° 4'. E. long. 12° 15'. In this island, as well as Favoyanna, both belonging to the king of Naples, he used to banish his state-prisoners.

MARETS, ROLAND DES, in *Biography*, a native of Paris, was born in 1594: he pleaded some time as an advocate at the French bar, till, disgusted with the contentions of the profession, he retired to a life of literary repose, and died in 1653. He was celebrated for an excellent skill in criticism, and for his knowledge in the Latin tongue. He wrote a number of Latin letters on literary topics, which were published after his death by M. de Launoy, under the title of "Rolandi Maresii Epistolarum philologicarum, Lib. ii." Moreri. Bayle.

MARETS DE ST. SORLIN, JOHN DES, brother of the preceding, a man of letters of a singular character, was born at Paris in 1595. He very early distinguished himself by the liveliness of his parts, and was in great favour with cardinal Richelieu, whom he used to assist in his literary productions. In recompence for his labours he had conferred on him the posts of comptroller-general of the war extraordinaries, and secretary-general of the marine of the Levant. He was one of the first members of the French Academy, and made himself known by a variety of compositions in poetry and romance. He was likewise a writer, and his most popular piece is the comedy of "Les Visionnaires." He led a very licentious life, but in old age he became a devotee and fanatic, and was a bitter enemy of the Jansenists, whom he attacked in writings full of extravagance. He applied the prophecies in the book of Revelations to Lewis XIV., who, according to his account of the matter, was at the head of 144,000 men to destroy heresy and Mahometanism, and bring the whole world to the profession of the true faith. He died in 1676, at the age of eighty-one. Bayle.

MAREUIL, in *Geography*, a town of France, in the department

partment of the Dordogne, and chief place of a canton, in the diftrict of Montron; 21 miles N.W. of Perigueux. The place contains 755, and the canton 9320 inhabitants, on a territory of 210 kiliometres, in 18 communes.—Alfo, a town of France, in the department of the Vendée, and chief place of a canton, in the diftrict of Fontenay-le-Comte; five miles N. of Luçon. The place contains 240, and the canton 4239 inhabitants, on a territory of 160 kiliometres, in 17 communes.

MARGA, Marle. See Marle.

Marga, *St.*, in *Geography*, a fmall ifland of Hungary, in the Danube; 10 miles S. of Buda.

MARGAB, or Margus, a river of Perfia, which rifes about 30 miles E. from Herat, and lofes itfelf in the earth near Hamadan.

MARGAMARGA, a river of Chili, which runs into the Pacific ocean, S. lat. 33°.

MARGAMI, a town of Japan, in the ifland of Xicoco; 8 miles N. of Ovitfi.

MARGARET, in *Biography*, queen of Denmark, Norway, and Sweden, daughter of Waldemar III., king of Denmark, was born in 1353: fhe was married, while very young, to Haquin, king of Norway, and fon of Magnus, king of Sweden. At her father's death, in 1375, fhe was a widow, and her fon Olaus, then only nine years of age, was chofen king of Denmark and Norway, fhe being appointed the regent. In 1387, Olaus died, leaving the male line of the three northern crowns extinct. Margaret was unanimoufly elected to the crown of Denmark, and afterwards to that of Norway. The States urged her to enter into the matrimonial connection a fecond time, in order to prevent any difputes with regard to the fucceffion of the crown, but fhe declined the propofal, and nominated for her fucceffor apparent, the neareft of blood of the royal family, *viz.* Henry of Pomerania, from that time called Eric. Henry, duke of Mecklenburg, brother to Albert, king of Sweden, declared himfelf a competitor with Margaret, and engaged Albert in his caufe. Preparations for war were made on both fides; a decifive battle was fought, in which Albert was defeated and made prifoner, and Margaret was prefented with the crown of Sweden. In 1395 fhe was folemnly crowned queen of the three northern kingdoms. She caufed Eric to be confirmed and acknowleged as her fucceffor, procured a redemption of the crown land alienated by Albert in Sweden, and adopted a number of prudent regulations for the confirmation of her authority, and the healing of animofities. She was particularly attentive to the adminiftration of juftice in her dominions, and to the enforcement of the laws upon all ranks of her fubjects. She protected and encouraged commerce, by providing for the fecurity and good treatment of foreign merchants reforting to her ports, and employed the moft vigorous means of fuppreffing piracy. In 1397 was concluded the famous union of Calmar, by which the three northern kingdoms were declared to be indiffolubly united under one head, who fhould be chofen fucceffively by each of the three, and then confirmed at an affembly of the whole, and fhould fpend his time equally between them, applying the revenue of each to its own expenditure. Other regulations alfo were enacted for the maintenance of the equal rights and privileges of the three kingdoms, and the prevention of difputes. Notwithftanding, however, all the care that was taken on the fubject, this treaty proved the fruitful fource of wars and diffentions for feveral centuries. An attempt was foon after made to recover the ifle of Gothland from the Teutonic knights. There were likewife difputes with the houfe of Holftein, which had been fuffered to gain poffeffion of Slefwick, and thefe continued, with little intermiffion, during the remainder of the reign. Margaret, by the vigour of her adminiftration, retained her full authority at home, and made herfelf refpected abroad. She was lefs friendly to her Swedifh fubjects than to thofe of Denmark, on which account the nobles of Sweden, in a body, prefented a remonftrance on the violations of their rights, to which fhe haughtily and imprudently replied, that "they might guard them with as much vigilance as fhe would keep the fortreffes of the kingdom." She died in 1412, after a reign, including the regency, of thirty-fix years. From the extent of her dominion, the policy of her adminiftration, and perhaps from a fufpicion of irregularity in her morals, fhe obtained the title of the "Semiramis of the North." That fhe poffeffed the qualities of induftry, activity, fteadinefs, and refolution, there can be no doubt, and it is faid fhe had a natural eloquence fitted to imprefs a public affembly. Univer. Hift.

Margaret *of Anjou*, celebrated in the hiftory of England, was the daughter of René, titular king of Sicily, Naples, and Jerufalem, defcended from the count of Anjou, brother of Charles V. of France. Brought up in a court without power or rule, her natural ftrength of mind was not enfeebled by early indulgence, and fhe became diftinguifhed as the moft accomplifhed young princefs of her time, when fhe was fixed upon by cardinal Beaufort and his friends as wife of Henry VI. of England. Upon her marriage fhe threw herfelf into the hands of that party which had been the means of her elevation, and to her difgrace it has been charged upon her that fhe was actually privy to the murder of Humphrey, duke of Gloucefter. The reign of Henry VI., at this time, was difquieted by rancorous and contending factions, and in 1454, while the national difcontents were rifing to a crifis, Margaret was delivered of a fon, and fhe was, almoft immediately upon her recovery, called upon to exert herfelf in refifting the Yorkifts, who had gained the victory of St. Alban's. Henry was made prifoner, but his confo t was n t d fp rited; fhe raifed troops, and fupported the royal caufe with fo much fpirit, that fhe was able to reftore her hufband to a nominal fovereignty, and effect a favourable compromife. In 1459, the war was renewed, when Henry fell again into the power of his enemies, and the queen, with her infant, was glad to efcape firft to Durham, and then into Scotland, whence returning to the north of England, fhe engaged the nobles and great men who lived in that part in her caufe, and foon by their means collected a powerful army. With this fhe met the duke of York at Wakefield in the month of December 1460, and gave him a total defeat. The duke was flain, and his head, by the exprefs command of the queen, was cut off, and placed on the gates of the city of York, being firft crowned, in derifion, with a paper diadem. After this fhe was again victorious in feveral actions, and in 1461 recovered the perfon of the king. In every inftance fhe difplayed a fanguinary and revengeful difpofition towards thofe who fell into her hands, and againft whom fhe bore any ill-will. The approach of Edward with a fuperior force obliged her again to retreat to the north, and that prince was elevated to the throne by the people of London, an event which feemed to give a fatal blow to the hopes of the houfe of Lancafter. In the month of March, the moft bloody of all thefe battles was fought at Towton, in Yorkfhire, in which the Lancaftrians were totally defeated, and Margaret and Henry made a hafty retreat into Scotland. After this fhe went over to France, to feek that affiftance from the French which fhe had in vain folicited from her nearer neighbours the Scotch. For this purpofe

pofe fhe propofed to deliver Calais to the French king on the event of Henry's being reftored to the crown, and on this condition fhe obtained two thoufand men at arms, with which fhe was allowed to land in Scotland. Here fhe was joined by others in her own intereft, and proceeded to Hexham, in Northumberland, where fhe was met by a force under lord Montacute, who routed and totally difperfed her troops. Margaret with her fon fled into a foreft, where fhe was defcried by a band of robbers, who ftripped her of her jewels, and treated her perfon with great indignity. Fortunately fhe efcaped while her plunderers were quarrelling about the booty, and penetrating into the depth of the foreft, fhe wandered about till fhe was exhaufted with fatigue and terror. At length, feeing a man approach with a drawn fword, fhe fummoned refolution enough to go out to meet him, faying, "here friend, I commit to you the fon of your king, for that protection which I am unable to afford him." The man, though a robber, was difarmed of every ill intention by the confidence which was repofed in him, and devoted himfelf to their fervice. After concealing them fome time in the woods, and providing for their fupport, he conducted them in fafety to the fea-coaft, whence they took an opportunity of efcaping into Flanders. She lived feveral years in retirement, while her hufband continued a prifoner in the Tower of London. At length, in 1470, fhe was encouraged to join the earl of Warwick, who had commenced a rebellion againft Edward, which ended in that change of affairs which obliged the king to quit his country, and take refuge in Flanders. Margaret, with the view of feconding his efforts, landed at Weymouth with a fmall body of French troops, and on that day, the 14th of April 1471, the battle fought at Barnet put an end to the life of Warwick and the hopes of the confederacy. Margaret, relying ftill on her good fortune, once more encountered the victorious Edward at Tewkefbury, where fhe fuffered a total defeat, and was with her fon taken prifoner; the latter was flain in cold blood by the merciless conquerors. Margaret was thrown into the Tower of London, in which her hufband about that time perifhed; fhe was afterwards ranfomed by Lewis XI., and retired into France, where fhe died in 1482. She underwent more changes of fortune, and fuffered a larger portion of calamities, than can fcarcely be parallelled in the hiftory of crowned females. Her great talents and unfubdued fpirit excited general admiration, while her fanguinary and ferocious difpofition, and the preference which fhe was inclined at all times to give to her native country, rendered her an object of abhorrence to the greater part of the Englifh nation. Shakfpeare, whofe hiftorical plays are the echo of popular opinion, defcribes her in very dark colours, and as deftitute of all the tendernefs and modefty of her fex. Hume's Hift. of England.

Margaret *of Valois*, queen of Navarre, fifter to Francis I., king of France, was born at Angoulême in the year 1492. She married the duke of Alençon in 1509, and became a widow in 1525. When her brother was prifoner in Spain, and extremely ill through the treatment to which he was expofed, fhe paid him a vifit, and reftored him to health by her kind offices, in return for which he promoted her marriage with Henry d'Albret, king of Navarre, upon very advantageous conditions. As foon as fhe was feated on the throne of this fmall kingdom, fhe united with her hufband in every effort to make it flourifh, by encouraging agriculture and the ufeful arts, improving the adminiftration of juftice, and promoting knowledge and civilization. She was herfelf of an inquifitive turn of mind, and in contemplating the principles of the reformers, it was fuppofed fhe had become a convert to their opinions; at any rate fhe afforded protection to feveral divines who were perfecuted for their opinions, and even interceded with her brother in favour of the reformed in his territories. She was fond of the bible, of which fhe got a rude tranflation in the French language, and from this fhe felected parts which fhe formed into fcenes that were reprefented in her court. She wrote a work intitled "Le Miroir de l'Ame pechereffe," which was printed in 1533, and which incurred the cenfure of the Sorbonne. On account of her attachment to the new opinions, fhe underwent fome ill treatment from her hufband, who would probably have been more fevere with her had not her brother interpofed to ftop his hand. His affection for her continued even after he himfelf had become a violent perfecutor of the reformed in his own kingdom; but it muft be obferved that fhe never threw off the exterior profeffion of the Catholic religion, and became more affiduous in her compliance with its ceremonials as fhe advanced in years, and is even fuppofed finally to have returned to the faith in which fhe had been educated. "It will appear remarkable," fays one of her biographers, "that a lady fo much addicted to ferious and pious contemplations, and certainly of unfufpected virtue, fhould have compofed a fet of tales as licentious as thofe of Boccacio; but fuch contradictions were not uncommon at a time when the general manners were grofs, and decorum was little underftood." This work was entitled "L'Heptameron, ou fept Journèes de la Reyne de Navarre." It was written while fhe was young, and was not printed till after her deceafe, which happened in 1549, leaving only one child, Joan d'Albret, queen of Navarre, and mother to Henry IV. The ftyle of the L'Heptameron, &c. was lively and fimple, and the ftories well invented. It has been very frequently reprinted. A collection of her poems and other pieces was publifhed in 1547, by her valet-de chambre, John de la Haye, with the title of "Marguerites de la Marguerite des Princefes." Univer. Hift. Bayle.

Margaret, *St.* in *Geography*, a river of Canada, which runs into the Jagueray, N. lat. 48° 20′. W. long. 69° 36′.

Margaret's *Bay St.*, a port on the S. coaft of Nova Scotia, between Profpect harbour and Mahon bay; from which laft it is feparated by a promontory, on which is the high land of Afpotagoen.—Alfo, a bay in the Englifh Channel, on the E. coaft of Kent; five miles N N E. of Dover.

Margaret's *Iflands*, iflands in the North Pacific ocean, difcovered by Capt. Magee, in the fhip Margaret of Bofton, in his voyage from Kamtfchatka in 1780. N. lat. 24° 40′. E. long. 141° 12′.

Margaret's, *St.*, *Ifland*, an ifland near the S. coaft of Wales; three miles W. of Tenby.

MARGARICARPUS, in *Botany*, fo called, as it appears, from μαργαρον, *a pearl*, and καρπος, *fruit*, becaufe of its white round drupa. Vahl indeed, and the authors he quotes, write it *Margyricarpus*, which may furely be corrected without offence. Vahl. Enum. v. 1. 307. Clafs and order, *Diandria Monogynia*. Nat. Ord. *Senticofæ*, Linn. *Rofaceæ*, *fect.* 3, *Sanguiforbæ*, Juff.

Gen. Ch. *Cal.* Perianth fuperior, in four or five deep, ovate, equal fegments. *Cor.* Petals four or five, ovate, fmaller than the fegments of the calyx; fometimes wanting. *Stam.* Filaments two, fometimes three, thread-fhaped, longer than the calyx; anthers roundifh, in two deeply divided lobes. *Pift.* Germen inferior, ovate, compreffed; ftyle thread-fhaped, the length of the ftamens; ftigma peltate. *Peric.* Drupa roundifh, fomewhat flefhy, umbilicated, of one cell. *Seed.* Nut quadrangular, of one cell.

Obf. The flowers are faid to be fometimes dioecious, in which

which cafe the males, at leaft, are furnifhed with petals. Vahl characterizes the genus as deftitute of a corolla. The permanent leaves of the calyx have, by fome perfons, been taken for leaf-like ftyles or ftigmas.

Eff. Ch. Calyx in four or five deep fegments, fuperior. Petals fmaller than the calyx. Stigma peltate. Drupa with one feed.

1. M. *fetofus*. Briftly Pearl-berry. Fl. Peruv. v. 1. 28. t. 8. f. *d. Vahl.* (Empetrum pinnatum; Lamarck Dict. v. 1. 567. Anciftrum barbatum; Lamarck Illuftr. v. 1. 77.)—Native of Brafil, Peru, and the dry hills of Chili. Our fpecimen was gathered by Commerfon at Monte Video, in fandy ground. The *ftem* is fhrubby, round, fmooth, with a deciduous fcaly bark, and numerous fcattered leafy *branches*, clothed with the permanent, rigid, briftle-like *footftalks*, dilated at their bafe. *Leaves* oppofite, crowded, pinnate, near an inch long, of three or four pair, with an odd one, of equal, linear, pointed, entire, revolute leaflets, fmooth, except fome deciduous hairs at the point. *Flowers* axillary, nearly feffile, fmall. We find *ftamens* and *piftil* in the fame flower, the former being permanent till the *fruit* is ripe, as is alfo the *ftyle*, which is curved, tipped with its white peltate *ftigma*.

MARGARITA, Francesca, de l'Epine, in *Biography*, an Italian finger, born in Tufcany, who came to England at the beginning of the laft century with a German mufician of the name of Greber, feems to have been one of the firft female Italian fingers who appeared on our ftage, before any attempt had been made at an Italian opera. June 1, 1703, in the theatrical advertifement for Lincolns-Inn-Fields, when the "Rival Queens" was promifed; it is faid that "Signora Francefca Margarita de l'Epine would fing, being pofitively the laft time of her finging on the ftage during her ftay in Enland." She continued, however, finging more *laft* and *pofitively laft times* during that whole month, and never quitted England, but remained here to the end of her life. In moft of the firft attempts at opera in England, fhe performed a capital part, till the year 1708, when, retiring from the ftage, fhe married Dr. Pepufch.

In 1704, fignora Margarita fings, for the firft time, at Drury-lane. At her fecond appearance there was a difturbance in the theatre while fhe was finging, which, from the natural and uncommon effects of rival malice, was fufpected to have been created by the emiffaries of Mrs. Tofts; an idea the more difficult to eradicate, as the principal agent had happened to live with that lady as a fervant. But as the law of retaliation is frequently practifed on the like occafions by the injured party, it was thought neceffary, a few days after, to infert the following paragraph and letter in the Daily Courant, Feb. 8, 1704: "Ann Barwick having occafioned a difturbance at the theatre-royal Drury-lane, on Saturday night laft, the fifth of February, and being thereupon taken into cuftody, Mrs. Tofts, in vindication of her innocency, fent a letter to Mr. Rich, mafter of the faid theatre, which is as followeth: Sir, I was very much furprifed when I was informed that Ann Barwick, who was lately my fervant, had committed a rudenefs laft night at the playhoufe, by throwing of oranges, and hiffing when Mrs. l'Epine, the Italian gentlewoman, fung. I hope no one can think that it was in the leaft with my privity, as I affure you it was not. I abhor fuch practices; and I hope you will caufe her to be profecuted, that fhe may be punifhed as fhe deferves. I am, fir, your humble fervant, Katharine Tofts.—To Chriftopher Rich, efq. at the theatre-royal, Feb. 6, 1704."

The rivalry of Mrs. Tofts, the favourite Englifh finger, at the beginning of the laft century, and the Margarita, and the zeal of their feveral friends, gave rife to the firft mufical feud which we hear of in this country. According to Hughes, author of the Siege of Damafcus, their abilities were difputed by the firft people in the kingdom.

"Mufic has learn'd the difcords of the ftate,
And concerts jar with Whig and Tory hate.
Here Somerfet and Devonfhire attend
The Britifh Tofts, and ev'ry note commend;
To native merit juft, and pleas'd to fee
We've Roman arts, from Roman bondage free.
There fam'd l'Epine does equal fkill employ,
While lift'ning peers croud to th' ecftatic joy:
Bedford to hear her fong his dice forfakes,
And Nottingham is raptur'd when fhe fhakes.
Lull'd ftatefmen melt away their drowfy cares
Of England's fafety, in Italian airs.
Who would not fend each year blank paffes o'er,
Rather than keep fuch ftrangers from our fhore."

From the connection between the Margarita and Greber, with whom fhe arrived in England, fhe became diftinguifhed by the title of *Greber's Peg*. When fhe quitted Greber, fhe commenced another connection with Daniel earl of Nottingham, to which Rowe alludes in an imitation of an ode of Horace, "Ne fit ancillæ tibi amor pudori."

"Did not bafe Greber's Peg inflame
The fober earl of Nottingham,
Of fober fire defcended?
That carelefs of his foul and fame,
To play-houfes he nightly came,
And left church undefended."

The earl had written againft Whifton on the doctrine of the Trinity.

An epigram, written by the earl of Halifax, is extant on the fame fubject.

On Orpheus and Signora Francefca Margarita.

"Hail, tuneful pair! fay by what wond'rous charms,
One 'fcap'd from hell, and one from Greber's arms?
When the foft Thracian touch'd the trembling ftrings,
The winds were hufh'd, and curl'd their airy wings;
And when the tawny Tufcan rais'd her ftrain,
Rook furls the fails, and dares it on the main.
Treaties unfinifh'd in the office fleep,
And Shovel yawns for orders on the deep.
Thus equal charms and equal conquefts claim,
To him high woods and bending timber came,
To her fhrub-hedges, and tall Nottingham."

The applaufe of the public, and admiration of individual partifans, were pretty equally beftowed on the two Sirens of the time, Mrs. Tofts and the Margarita.

The vocal merit of the Margarita muft have been very confiderable to have kept her fo long in favour as a finger on the Englifh ftage, where, till fhe was employed at the opera, fhe fung either in mufical entertainments, or between the acts, almoft every night. Befides being *out-landifh*, fhe was fo fwarthy and ill-favoured, that her hufband, Dr. Pepufch, ufed to call her *Hecate*, a name to which fhe anfwered with as much good humour as if he had called her Helen. But with fuch a total abfence of perfonal charms, our galleries would have made her fongs very fhort, had they not been executed in fuch a manner as to filence theatrical fnakes, and command applaufe.

Dean Swift, who was no refpecter of perfons, particularly mufical,

mufical, in his "Journal to Stella," letter xxiv. Auguft 6, 1711, being at Windfor, fays, "We have a mufic-meeting in our town to-night. I went to the rehearfal of it, and there was Margarita, and her fifter, and another drab, and a parcel of fiddlers; I was weary and would not go to the meeting, which I am forry for, becaufe I heard it was a great affembly." He talks frequently of the mufic-meeting this fummer and autumn at Windfor, but always with contempt—as, "in half an hour I was tired of their *fine fluff.*"

When the Margarita retired from the ftage, fhe is faid to have accumulated a fortune of 10,000*l.* After her marriage, fhe applied clofely to the practice of the harpfichord, upon which inftrument fhe became a great proficient; yet never could conquer Dr. Bull's variations to an old tune called "Walfingham," in queen Elizabeth's Virginal book, which was divided and fubdivided in a moft full and complicated manner thirty different ways; and feveral of Dr. Pepufch's friends and pupils, who went frequently to her apartments at the Charter-houfe, have affured us, that though this curious MS. was conftantly open upon Mrs. Pepufch's harpfichord-defk, fhe never advanced to the end of the variations; as feems likewife manifeft from the colour as well as wear and tear of the leaves, which are much more clean and entire in every other part of the book than at the firft ftrain of this compofition. This lady, who had made fo much noife in the world, left it very quietly in 1740.

MARGARITA *Philofophica*, the title of a mufical tract. See REISCHUSI.

MARGARITA, or *Margaretta*, in *Geography*, an ifland in the Caribbean fea, near the coaft of Terra Firma, difcovered by Columbus about the year 1498. It now forms one of the provinces belonging to the royal audience of Caraccas, eftablifhed in 1786; the other provinces being Venezuela, Maracaibo, Cumana, Varinas, and Guiana. The governor of Caraccas reprefents the monarch throughout thefe provinces; all the military departments being completely fubject to his orders, though on great occafions he confults a "Junta de Guerra," or council of war, compofed of the chief officers. Governors, however, are delegated for each province, who are appointed for five years, with a lawyer as an affeffor. The ifland poffeffes but few attractions; the foil is poor and produces only cotton. It has, however, a fmall garrifon, confifting of one company of regular troops, four of white militia infantry, one of artillery, one of cavalry, and four infantry companies of people of colour. On the firft difcovery of Terra Firma, a pearl-fifhery, which was the principal fource of the riches of the country, and of the revenues of the king, was carried on between the iflands of *Cubagua* (which fee) and Margarita, at the expence of the lives of a great number of Spaniards and Indians who perifhed in the bufinefs. The ifland is, perhaps, defirable as a military and commercial ftation; becaufe, as it is feparated from Terra Firma by a diftance of only eight leagues, and to windward of all her provinces, it might become under a fyftem of free commerce the general entrepot of Cumana, Barcelona, Caraccas, Guayra, and all the cities of the interior. This ifland alfo ferves to form the channel, that feparates it from Terra Firma, fometimes called "the Straits of Margarita." This channel is not navigable for the whole eight leagues of its width. The ifland of Coche, fituated in the middle, leaves the navigator a very narrow paffage two leagues from Margarita, through which he muft indifpenfibly pafs. Every veffel coming from windward, or from Europe to Cumana, to Barcelona, and even to Guayra, is obliged to run down the S. fide of Margarita. If this ifland were in the power of the enemies of Spain, all the commerce with Europe, all intercourfe with the neighbouring iflands would be fo much the more eafily intercepted, as thofe which endeavoured to avoid the channel would be taken by privateers, when Margarita would ferve as an arfenal. Befides, an enterprizing enemy would find in the fituation of Margarita means of eafily diverting expeditions againft any part of Terra Firma which he might wifh to invade. Through the whole coaft of this ifland there are but three ports; the firft and principal is "Pampatar" to the E.S.E.; the fecond, called "Pueblo de la Mar," is one league leeward of the preceding; and the third is on the N. fide, and therefore called "Pueblo del Norte" the village of the North. The capital city is "Affumption," built almoft in the centre of the ifland. The whole population of the ifland is 14,000 perfons, confifting of 5500 whites, 2000 Indians, and 6500 flaves and freed perfons. The principal riches of the inhabitants are derived from the pearl-fifheries eftablifhed in the ifland of Coche, in the middle of the channel. Thefe fifheries are carried on by the Indians of the ifland, who alfo take a number of turtles and an immenfe quantity of fifh, which they falt, and fell throughout the continent and neighbouring iflands. They fabricate at Margaretta thofe hammocks of cotton, whofe web is fo much fuperior to the hammocks manufactured in any other place. They alfo make very fine cotton ftockings, which are fold at a very dear rate. This ifland has alfo fo many parrots and curious birds, that no veffel leaves the ports of Margaretta without having a fmall cargo of them on board. The poultry raifed here becomes a refource for the poor, who fell their fowls and turkies to the foreign iflands. N. lat. 10° 56'. W. long. from Paris between 66 and 67°.

MARGARITA, (a rabbinical term), a white fpeck on the eye. See LEUCOMA.

MARGARITÆ. See PEARLS.

MARGARITARIA, in *Botany*, was fo named by Linnæus from the kernels of its berries being of a fhining white colour, and refembling pearls, margaritæ. Linn. Suppl. 66. Schreb. 694. Juff. 430. Mart. Mill. Dict. v. 3.—Clafs and order, *Dioecia Octandria*. Nat. Ord. uncertain, Juff.

Gen. Ch. Male, *Cal.* Perianth inferior, of one leaf, four-cleft, fmall, permanent. *Cor.* Petals four, roundifh, inferted into the calyx. *Stam.* Filaments eight, briftle-fhaped, fpreading, rather long, inferted into the receptacle; anthers roundifh, fmall. *Pift.* Germen fuperior, roundifh; ftyle briftle-fhaped, the length of the ftamens; ftigma obtufe.—Female, on a diftinct plant. *Cal.* Perianth as in the male, permanent. *Cor.* as in the male? *Pift.* Germen fuperior, globofe; ftyles four or five, thread-fhaped; ftigmas fimple, permanent. *Peric.* Berry globular, crowned with fpreading, fhort ftyles. *Seeds* ovate, compreffed on the inner fide, inclofed in a tunic of four or five lobes and as many cells, which is cartilaginous and highly polifhed.

Eff. Ch. Male, Calyx four-toothed. Petals four.

Female, Calyx and Corolla like the male. Styles four or five. Berry four or five-feeded, inclofed in a cartilaginous tunic.

1. *M. nobilis.* Linn. Suppl. 428. Syft Veg. ed. 14. 890. (Euonymus margaritifera pentacoccos americana; Pluk. Phyt. t. 176. f. 4)—Linnæus had feveral fpecimens of this plant, at different periods of its growth, fent by Dalberg from Surinam.— The *ftem* is fhrubby. What Linnæus conceives to be the male has oppofite, oval, large, veined, entire *leaves*, on footftalks. *Panicles* formed by compound clufters of fmall *flowers*. In the Female, the *branches* and *leaves* are alternate. *Stalks* fingle-flowered.

The

The *kernel* of the *berry* four or five-grained, remarkably ſhining and pearl-coloured.—There ſeems to be great reaſon for ſuppoſing that under theſe two ſexes of *Margaritaria*, very different plants are deſcribed, though ſent to Linnæus as different ſexes of the ſame ſpecies. At the end of his account of *M. nobilis*, as deſcribed in the *Supplementum Plantarum*, he appears ſomewhat to doubt whether their union be correct.

MARGARITIMA, in *Geography*, a town of European Turkey, in Albania; 34 miles W. of Arta.

MARGARITINI are glaſs ornaments, made at Venice of ſmall glaſs tubes of different colours, which are blown at Murano, and which the women of the lower claſs wear about their arms and necks. The larger ſort are uſed for making roſaries. This work is performed with great diſpatch, the artiſan taking a whole handful of thoſe tubes at once, and breaking them off one after another with an iron tool. Theſe ſhort cylinders are mixed with a kind of aſhes, and put over the fire in an iron pan; and when the two ends begin to melt, by ſtirring them about with an iron wire, they are brought to a round figure; but care is taken not to leave them too long over the fire, leſt the hole through which they are to be ſtrung, ſhould be entirely cloſed by the melting of the glaſs. There are ſeveral ſtreets at Franceſco di Vigna, entirely inhabited by people whoſe ſole occupation is to make and ſtring theſe margaritini. Keyſler's Travels, vol. iii. p. 301.

MARGATE, in *Geography*, a market-town in the juriſdiction of the liberties of Dover, and county of Kent, England, is ſituated on the ſea-coaſt, at the northern extremity of the Iſle of Thanet, 16 miles diſtant from Canterbury, and 72 N.E. of London. Though now one of the moſt faſhionable and beſt frequented watering-places in the kingdom, it has only obtained its principal celebrity within the laſt fifty years, before which it was a ſmall fiſhing-town, irregularly built, and the houſes generally old and low. Its antiquity, however, is much more conſiderable: it has been a member of the port and town of Dover from a remote period; in Leland's time there was a pier "here for ſhyppes, but ſore decayed." When the ſurvey of maritime places in Kent was made in the eighth year of queen Elizabeth's reign, the number of houſes in "Margate was 108; boats and other veſſels, fifteen of various burthens, from one ton to eighteen; the perſons belonging to theſe veſſels, occupied in carrying grain and fiſhing, ſixty." Where the pier is now built, there was anciently a ſmall creek, which probably gave origin to the town, from the ſhelter it afforded to fiſhing-veſſels and other craft. The land on each ſide of the creek was progreſſively waſhed away by the ſea; and the inhabitants were obliged to conſtruct a pier to prevent the town from being overflowed, and to defend that part of it which lies next the water. This pier was at firſt very ſmall, and extended but a little way from the land; but the encroachments of the ſea rendered it neceſſary to enlarge it. In queen Elizabeth's time it was maintained by certain rates paid on corn and other merchandize, which were either ſhipped or landed here: but, through the neglect of the perſons employed, theſe rates were neither duly collected nor applied, and the pier went gradually to decay. By an act of parliament, (11 Geo. I.) theſe payments, and the application of them, were enforced, and the pier maintained till the year 1787, when another act was obtained, under which the pier has been re-built with ſtone, and extended ſo as to enlarge the harbour, and form a more complete ſecurity for ſhipping. To provide ſecurity to this harbour, and conſtruct a pier in a permanent manner, have frequently been but unſucceſsfully attempted: it is confidently expected that theſe important ends will be at length accompliſhed under the able and ſcientific direction of John Rennie, eſq. engineer.

The improvement of the harbour, and the great reſort of company to this coaſt, have occaſioned a conſiderable increaſe in the number of fiſhing and other craft belonging to this port; ſo that the town is not only ſupplied with fiſh for its own conſumption, but great quantities are continually ſent to the metropolis. The whole number of packets, hoys, boats, &c. which now belong to Margate, is about ſeventy. Among the articles imported, are coals from Newcaſtle and Sunderland, and deals, hemp, tin, iron, &c. from Memel and Riga.

Margate is a large and ſcattered place; it is built on irregular ground; part of it being very elevated, while the other part is ſituated in a bottom, cloſe to the ſea-ſhore. The houſes are principally of brick, and many of them are large and commodious. The general recommendation given by medical men to ſea-air and ſea-bathing, and alſo the faſhionable propenſity of ſpending ſome portion of the year at a watering-place, have been the grand cauſes of the extenſion and progreſſive improvements of the town. As the number of viſitors increaſed, the buildings for their accommodation were rapidly augmented, the landholders rightly judging that the ſpeculation would be ſucceſsful. Two handſome ſquares have been formed; various new ſtreets and ranges of houſes have been raiſed, and ſcarcely a year paſſes without ſome additions being made. The amuſement as well as the accommodation of the viſitors have been provided for by the erection of hotels, lodging-houſes, &c. At the ſouth corner of Cecil-ſquare are the aſſembly rooms, which form a ſpacious building of the Ionic order, with Venetian windows, entablature, and cornice; on the ground-floor are a billiard-room and a coffee-room, ſeveral dining-parlours, and a piazza ſupported by a range of duplicated Doric columns. On the firſt-floor are the tea, card, and ball-rooms; the latter is a very elegant apartment, eighty-ſeven feet in length, and forty-three in breadth: five large elegant glaſs chandeliers are ſuſpended from the cieling. Near the eaſt corner of Hawley-ſquare is the theatre-royal, a ſpacious ſtructure, erected in the year 1787, at the expence of 4000*l.* The exterior is plain; but the interior is highly ornamented: the time of acting is reſtricted to the ſeaſon. Other ſources of amuſement are found in ſeveral handſome and reſpectable libraries.

The bathing-rooms are ſituated on the weſtern ſide of the High-ſtreet, near the harbour. The bathing-place is a level ſandy ſhore, extending under the cliffs for ſeveral miles, and forming, at proper times of tide, a pleaſant walk. But the moſt faſhionable promenade is the pier, which, being finiſhed by a parapet breaſt high, is perfectly ſafe, and is the general reſort of the company.

Margate was anciently a chapelry to Minſter, but was made parochial in the year 1290. The church, a ſpacious edifice, ſtands on an elevated ſpot at the ſouth-eaſt ſide of the town; it conſiſts of a nave, chancel, and aiſles, with a ſquare tower at the north-weſt angle. The nave is divided from the aiſles by eight arches, ſpringing from octagonal and round columns; the latter have ornamented capitals in the Norman ſtyle. The monuments and braſſes within the walls are numerous, and ſeveral of them are of conſiderable antiquity. Beſides the church, here are four places of religious worſhip; one for Baptiſts, one for Roman Catholics, a third for the followers of Mr. Weſley, and the fourth, called Zion-chapel, on the eſtabliſhment of the late counteſs of Huntingdon. The principal charitable inſtitutions are a general ſea-bathing infirmary, eſtabliſhed in 1792; Draper's hoſpital, or alms-houſes for widows, erected in 1709, purſuant to the will of Michael Yoakley, a Quaker; and a charity-

charity-school, built in 1787, for forty boys and forty girls.

There appears to have been a market kept here in the time of Charles I., of which a monthly return was made to Dover; but this was soon discontinued. Well-supplied markets are now held on Wednesdays and Saturdays, under a grant made in the year 1777 to Francis Cobb and John Baker, then wardens of the pier, and their successors. Under the population act of 1800, the number of inhabitants of this parish was 4766, occupying 1115 houses: whereby it appears that the population has been nearly doubled since Lewis wrote his History of the Isle of Thanet, in 1723. A Picture of Margate, &c. 12mo. 1809. Hasted's History of Kent, 12 vols. 8vo. Brayley's Beauties of England, &c. vol. viii. 8vo. 1807.

About a mile distant from Margate is situated Dandelion, so named from the original possessor, Dent de Lyon, who came to England with William the Conqueror. There still remain four towers, and a fine antique gate-house, of the original building, composed of alternate layers of brick and flint. On a scutcheon the armorial bearing and name of the founder may still be seen. Here are a fine garden and bowling-green, whence there is a beautiful and extensive view of Margate roads, the sea, and shipping. In this garden public breakfasts, with music and dancing, are given twice a week during the season. They are under the regulation of the master of the ceremonies, and constitute one of the most agreeable and rational amusements of this place.

The country around Margate is very fertile, and peculiarly healthy. The probable reasons of the salubrity of the Isle of Thanet are detailed in the preface to Dr. Buchan's "Treatise on Sea-Bathing," which will be found an useful companion to all persons resorting to the sea-coast on account of their health.

MARGEN, in the *Materia Medica*, a name used by some of the later Greek writers to express red coral. It is founded on an error, however; the word *margen* being made from the Arabian *margian*, which does not signify coral, but a purple seawrack, or fucus, used in dyeing. See MARGIAN.

MARGENFELT, in *Geography*, a town of Prussia, in the province of Oberland; 11 miles S. of Olterrod.

MARGENGAW, a town of Prussia, in the province of Pomerelia; six miles N. of Marienburg.

MARGENSTEIN, in *Natural History*, a name given by the German writers to a sort of indurated marle, which, while in the strata, is nearly of the hardness of stone; but when laid on the surface of the earth, and exposed to the wind and rain, soon dissolves, and enters the pores of the ground, enriching the soil to a very great degree.

We have the same sort of stony marle in some parts of England, only that our's is less hard, and yet takes more time to break and dissolve in the air. They are both most proper for lands of a loose loamy nature, and keep them in heart a long time.

MARGGRABOWA, in *Geography*, a town of Prussia, in the Lithuanian department; 80 miles S.E. of Königsberg. N. lat. 53° 54'. E. long. 22° 47'.

MARGGRAF, ANDREW SIGISMOND, in *Biography*, a celebrated chemist, was born at Berlin in the year 1709, where his father was apothecary to the court, and assessor of the college of medicine. Thus situated from his early years, his attention was naturally turned to the pursuits of chemistry and pharmacy, for which he imbibed a taste, which he afterwards cultivated with great industry under the celebrated professor Neumann, during a period of five years, and subsequently under professor Spielmann, at Strasburg. In 1733, he went to the university of Halle, where he became a pupil of Hoffmann in the study of medicine, and continued his chemical pursuits under the direction of Juncker, to which last science he ultimately devoted his sole attention. For the purpose of obtaining practical information on the subject of mineralogy, he resorted to Freyberg, in Saxony, in 1734, where Dr. Henckel was then in high reputation in that department of natural history; and he practised the art of assaying under Susmilch. In the following year he visited the Hartz mines, and then returned to Berlin, where, by a close and incessant application to his chemical labours, he so materially injured his health, that it was never afterwards vigorous. He passed the remainder of his life in his native city, notwithstanding an offer of the place of ducal apothecary to the duke of Brunswick, with a department in the mines, which was made to him in 1737 by that prince, but which he did not deem sufficiently advantageous to induce him to leave Berlin. In 1738, he was received into the Society of Sciences, and furnished some memoirs for the "Miscellanea Berolinensia;" and when this society was renovated in 1744, as the Royal Academy of Sciences and Belles Lettres, he was placed in the class of experimental philosophy, of which he was chosen director in 1760. He had also the high gratification of being entrusted with the laboratory of the academy in 1754, in which he almost lived, absorbed in the study or practice of his favourite art. He was, nevertheless, a man of great amenity of temper and considerable conviviality, when mixing in the society of his friends. He had been for some years liable to spasmodic affections, and, in 1774, was attacked with apoplexy, which left a paralysis behind it. He continued, however, to attend the meetings of the academy till the autumn of 1776; after which his mental and bodily powers gradually declined, and he died in August, 1782.

Marggraf was held in considerable estimation as a chemist throughout Europe, and had the honour of being elected a member of several learned bodies. All the writings which he produced were published in the Memoirs of the Literary Society of Berlin, before and after its renovation; but they have been collected and published both in German and French. They contain the details of a great number of processes and analyses, described in clear and simple language. Some of the most important of his discoveries relate to phosphorus and its acid; to the reduction of zinc from calamine; to the fixed and volatile alkalies; to manganese, the Bolognian stone, platina, and the acid of sugar. In short, he is entitled to rank among the more accurate experimentalists, who contributed to the advancement of the science of chemistry, before the recent luminous improvements which it has gained. Gen. Biog. See also his Eloge in the Mem. de l'Acad. Roy. de Berlin.

MARG-GRAVE. See MARGGRAVE.

MARGIAN, in *Botany*, a name given by some of the ancient writers, particularly the Arabian physicians, to the plant called by others *argina*, or *arginem*. This is described to be a purple sea-plant. Some have supposed that cochineal was meant by this word, but that is an error. Others have come somewhat nearer, in supposing it to be the name of coral; but as the ancients have said that it was used in dyeing, it could not be coral; and indeed there is no other plant that it can mean, but that fucus used by the Greeks in dyeing, and called *fucus porphyrizon*, or the purple-dyeing sea-plant.

MARGIANA, in *Ancient Geography*, a country of Asia, along the river Margus, from which it derives its name. According to Ptolemy, it had Hyrcania on the W., on the N. Oxus, on the E. Bactriana, and on the S. Aria. The people who inhabited it were the Derbicæ, the Massagetæ, the Tassoni, the Parni, and the Daæ. Its towns were Ariaca,

Ariaca, Sina, Aratha, Argadris, Jafonium, Rhea, Antiochia, Guriano, and Niceai. Pliny gives us a very favourable notion of the fituation and fertility of this country. It now forms a part of *Khorafan*, which fee.

MARGIANI, in *Geography*, a town of Perfia, in the province of Comis; 25 miles N. of Biftan.

MARGIDUNUM, in *Ancient Geography*, a place of Great Britain, fituated, according to the fixth Iter of Antonine, between Verometum (near Willoughby) and Ad Pontum (near Southwell.) Dr. Stukeley places it at Bridgeford, but Mr. Horfley, and fome other antiquaries, fix it near Eaft Bridgeford.

MARGLINAN, in *Geography*, a town of Turkeftan, at the union of a river of the fame name with the Sirr; eight miles S. of Tafchkund.

MARGOT, a river and heights of America, fituated on the E. fide of the Miffifippi. The courfe of the river is wefterly, and it is faid to be navigable for batteaux for a number of miles. The ground below its junction with the Miffifippi, in N. lat. 35° 28′, affords a commanding, airy, pleafant, and extenfive fituation for fettlements: the foil is remarkably fertile.

MARGOT *Port*, a maritime village on the N. fide of the ifland of St. Domingo, in N. lat. 19° 48′, nine leagues W. of cape François.

MARGOZZA, a town of Italy, giving name to a lake near it; 40 miles N.W. of Milan.

MARGUARSTEIN, a town of Bavaria, on the Acha; 25 miles W. of Salzburg.

MARGUERITAS, ISLES *of*, iflands in the Mediterranean, near Ivica, one of which is large and near Pic Nono, which advances into the fea, in the form of a cone, covered with trees.

MARGUERITE, ST., an ifland in the Mediterranean, near the coaft of France, nine miles from Antibes. N. lat. 43° 31′. E. long. 7° 7′.

MARGUERITE, a river of America, which runs into lake Michigan, N. lat. 44° 2′. W. long. 85° 34′.

MARGUERITES, a town of France, in the department of the Gard, and chief place of a canton, in the diftrict of Nimes; four miles N.E. of Nimes. The place contains 2057, and the canton 6359 inhabitants, on a territory of $157\frac{1}{2}$ kiliometres, in eight communes.

MARIA, AVE. See AVE MARIA.

MARIA THERESA, in *Biography*, emprefs of Germany, and queen of Hungary, daughter of the emperor Charles VI. was born at Vienna in 1717, and married Francis of Lorraine, grand duke of Tufcany, in the year 1736. At the death of her father in 1740, fhe remained fole heirefs of the dominions of the houfe of Auftria, which had been affured to her by the Pragmatic fanction, guarranteed by almoft all the powers of Europe. The hope of defpoiling an unprotected female was, however, too great a temptation to be overcome by mere treaties, and claims were made on all fides to part or the whole of the inheritance. She, however, took quiet poffeffion of it, and ingratiated herfelf with all her fubjects. The ftorm firft broke upon Silefia, which Frederic II. of Pruffia feized. He foon fecured to himfelf the poffeffion of this rich province by a victory, and his fuccefs induced the court of France, in conjunction with the elector of Bavaria, to enter into the war. Unable to contend effectually with the combined forces, Maria Therefa haftily retired to Prefburg, where, affembling the ftates of the kingdom, fhe appeared with her infant fon in her arms, and made fuch an animating and affecting addrefs, that the nobles all drew their fabres, and folemnly fwore they would die in defence of the rights of their fovereign. A powerful army was raifed, which marched to Vienna, and fecured it from affault, fo that the enemy could only boaft of the capture of Prague, and of having been the means of crowning the elector of Bavaria king of Bohemia. He was, fhortly after this, by the influence of the French, elected emperor of Germany. England felt an intereft in behalf of the queen, and joined her as an ally, while individuals of almoft every rank opened their purfes in aid of her caufe. She prudently detached from the confederacy the king of Pruffia, by ceding to him Silefia, and fhe contrived likewife by other ceffions to detach the king of Poland, elector of Saxony, from the number of her enemies. Without attempting to detail the occurrences of this war, which involved moft of the powers of Europe, we may obferve, that Maria Therefa difplayed, through the whole of the conteft, a degree of firmnefs and vigour, which would have done honour to any fovereign; that fhe was crowned queen of Bohemia at Prague, in 1743, that fhe placed the imperial crown upon the head of her hufband in 1745, and that by the peace of Aix-la-Chapelle, in 1748, fhe was confirmed in the poffeffion of all her dominions, excepting Silefia, which remained in the hands of the king of Pruffia. On the reftoration of peace, the emprefs queen, the title by which fhe was ufually known, turned her attention to the improvement of her dominions, by encouraging commerce and the ufeful arts. New ports were opened, and new fources of trade explored; canals were formed and manufactures eftablifhed; fchools and public libraries were founded, and a college for the fciences was inftituted at Vienna. This and a multitude of other acts bore witnefs to the zeal and intelligence with which this fovereign and her minifters purfued the great objects of public good. People are always grateful for the beneficent acts of their governors, and it was impoffible for love and veneration to be carried farther than thofe which were infpired by a fovereign, who, to female beauty and gentlenefs, added mafculine dignity and excellence. The court of Vienna could not brook the lofs of Silefia, and, in revenge, it inftigated a confederacy againft Frederic, with the view of depriving him of his conquefts, and perhaps of defpoiling him of a part of his hereditary dominions. For this purpofe an alliance was formed of the emprefs-queen, the emprefs of Ruffia, and the king of Poland as elector of Saxony; Frederic difcovered their plan and thwarted it. Soon after this the houfe of Auftria joined France in an attack upon the king of Pruffia, who was able to make a treaty with England. Frederic ftruck the firft blow and carried his arms into Bohemia, which was the commencement of what is generally called the feven years' war. The junction of Ruffia with his other enemies brought Frederic to the brink of ruin. He was, however, faved by his own great and almoft unparalleled efforts, and the treaty of 1763 confirmed him in the poffeffion of Silefia, and reftored Germany to its former political ftate. The only advantage gained by the emprefs-queen, was the election of her fon Jofeph to the fucceffion of the empire as king of the Romans. In 1765, fhe loft her hufband, the emperor Francis, with whom fhe had lived in conftant and affectionate union thirty years. So ftrong was her attachment to the memory, as it had been to the perfon of her hufband, that fhe ever after wore mourning, and paid frequent vifits to his tomb. In 1772, a plan was laid for the firft difmemberment of Poland, to which it was with the utmoft difficulty that the confent of Maria Therefa could be obtained. Her fon Jofeph, fixed on the object, and knowing her failings, addreffed to her the argument of religion, which fubdued her fcruples, that were unqueftionably founded in rectitude, and ought not

 to

to have been ſubverted. From this period ſhe did not interfere much in the management of public affairs, though ſhe did not heſitate to check the innovations of her ſon, eſpecially thoſe which went to the abolition of convents, and other changes in the church eſtabliſhment. She died at Vienna, in the autumn of the year 1780, at the age of ſixty-three, conſoling herſelf in her laſt moments with the purity of her intentions in all her conduct, and with the idea of having merited the honourable title of the "mother of her people." She left a numerous progeny, of whom one ſon Joſeph II. was emperor; another the grand-duke of Tuſcany; one daughter queen of France, another of Naples; "happy" ſays Dr. Aikin "that ſhe could not look into the awful ſecrets of futurity." A warm attachment to the duties of her religion was a prominent feature in her character; in ſome inſtances, perhaps, her zeal approached the borders of bigotry and intolerance; it muſt, however, be allowed, that her conduct in general diſplayed all the ſalutary influence of religious principles, and that as a wife, a mother, and a ſovereign, ſhe has had few equals upon the throne. Hiſt. of France. Gen. Biog. London 1790.

Maria, in *Ancient Geography*, a town of Italy, in Venetia; ſituated on the Padus, towards the S.E., and very near Hadria.

Maria, in *Geography*, a river of America, which runs into the Miſſiſippi, N. lat. 37° 37'. W. long. 90° 33'.—Alſo, a town of South America, in the province of Carthagena; 32 miles W. of Carthagena.—Alſo, a river of Honduras, which runs into the bay, N. lat. 15° 40'. W. long. 87° 15'.

Maria *Bay*, a bay on the N. coaſt of Tongataboo; ſeven miles W. of Obſervatory Point.

Maria, *St.*, a town of Tranſilvania; 12 miles S.E. of Hunyads.—Alſo, a town of Naples, in Lavora; 37 miles W. of Naples.—Alſo, a town of Iſtria; four miles N. of Monfalcone.—Alſo, a town with a convent of Hungary; ſix miles N. of Roſenburg.—Alſo, one of the Tremiti iſlands, now called "St. Nicolo."—Alſo, a ſea-port of the Ligurian Republic, in the gulf of Spezza; four miles S. of Spezza. N. lat. 44° 6'. E. long. 9° 42'.—Alſo, a ſmall iſland near the coaſt of Chili. S. lat. 37° 10'.—Alſo, a town of Braſil, in the government of Maranhao; eight miles N.E. of St. Felipe.—Alſo, a town of Mexico, in the province of Mechoacan; 32 miles S. of St. Luis de Potoſi.—Alſo, a town on the W. coaſt of the iſland of Mindanao. N. lat. 7° 33'. E. long. 122° 18'.—Alſo, a ſmall iſland in the Grecian Archipelago, near the N.E. coaſt of Paros.—Alſo, a town of New Mexico; 40 miles S. of Santa Fé.—Alſo, a town of New Navarre; 210 miles S.S.E. of Caſa Grande.

Maria *della Alizza*, a town of Naples, in the province of Otranto; four miles E. of Gallipoli.

Maria *di Camarana*, *St.*, a town of Sicily, in the valley of Noto, at the mouth of a river on the S. coaſt; the remains of a city called "Camarana;" 28 miles S.E. of Alicete.

Maria *del Alto*, a town of Naples, in Otranto; two miles S.S.W. of Nardo.

Maria *Apolſano*, *St.*, a town of Naples, in Capitanata; three miles S. of Monte St. Angelo.

Maria *di Dotoli*, *St.*, a town of Naples, in Otranto; 15 miles S.E. of Motera.

Maria *della Gratia*, a town of Italy, in the department of the Mincio; five miles W. of Mantua.

Maria *la Garta*, *St.*, a ſmall iſland in the N. Pacific ocean. N. lat. 27° 50'. W. long. 149°.

Maria *della Gratice*, a town of Naples, in Calabria Citra; ſix miles N. of Scalea.

Maria *dell' Iſola*, a town of Naples, in the province of Bari; three miles N. of Converſano.

Maria *di Leuca*, *St.*, a town of Naples, in Otranto, on the ſea-coaſt near cape Leuca; the ſee of a biſhop; 18 miles S. of Otranto.

Maria *Palomba*, *St.*, a town of Naples, in Otranto; five miles E.N.E. of Matera.

Maria *della Serra*, *St.*, a town of Naples, in Calabria Ultra; 11 miles E. of Nicaſtro.

Maria *de Iguazu*, *St.*, a town of Paraguay; 200 miles E. of Aſſumption.

Maria *de Iſquaude*, *St.*, a town of South America, in Popayan; eight miles N.W. of Barbacoa.

Maria *de Monte*, *St.*, a town of Italy; three miles E. of Friuli.

Maria *de Matamba*, *St.*, a town of Africa, capital of Matamba. S. lat. 9° 35'. E. long. 18° 34'.

Maria *de Darien*, *St.*, a town of South America, and capital of the province of Darien, on a river which runs into the bay of Panama. N. lat. 8° 4'. W. long. 78°.

Maria *del Gracia*, a town of Etruria; 31 miles E. of Florence.

Maria *Creek*, a river of the weſtern territory of America, which runs into the Wabaſh, N. lat. 38° 48'. W. long. 88°.

Maria, *Van Diemen*, *Cape*, the N.W. point of New Zealand. S. lat. 34° 30'. W. long. 187° 18'.

Maria *Zell*, a town of the duchy of Stiria; 12 miles N. of Pruck.

Maria's *Iſlands*, a cluſter of iſlands, near the ſouth part of New Holland, ſomewhat N.E. of Tannan's Head. S. lat. 43° 15'. E. long. 147° 46' to 148° 10'.

Maria, *Santa*, *Cape*, the N. cape at the mouth of La Plata river, in South America; 9 leagues from the bay of Maldonado, and 20 from Montevideo, a bay ſo called from a mountain which overlooks it.

Maria *Thereſa*, *Order of*, in *Heraldry*, a military order, which was inſtituted by the empreſs queen on the 18th of June, 1757, and compoſed of two claſſes, *viz.* Grand Croſſes and Knights. To theſe the emperor Joſeph II. in the year 1765 added an intermediate claſs, under the appellation of Commanders. The number of knights is not fixed, and the emperor is grand maſter. The badge of the order is a croſs of gold, enamelled white, edged with gold; on the centre are the arms of Auſtria, *viz.* gules, a feſſe argent encircled with the word Fortitudini; on the reverſe is a cypher of the letters M. T. F. in gold, on an enamelled green ground. The badge is worn pendent to a ſtriped crimſon and white ribbon.

MARIAGALANTE, in *Geography*. See Marie-galante.

MARIAGER, a ſea-port town of Denmark, in North Jutland, ſituated on a gulf which communicates with the Cattegat, called "Mariagerfiord." Its principal trade conſiſts in ſtone and lime; 22 miles E.N.E. of Wiborg. N. lat. 56° 43'. E. long 9° 53'.

MARIALVA, a town of Portugal, in the province of Beira; 16 miles N.E. of Pinhel.

MARIAM, a town of Abyſſinia; 100 miles E.S.E. of Gondar. N. lat. 11° 2'. E. long. 33° 34'.

MARIAME, in *Ancient Geography*, an epiſcopal town of Phœnicia, the ſovereignty of which was confirmed by Alexander the Great to Garaloſtratus, king of Arad.

MARIAN, or Marianne, *Iſlands*, in *Geography*. See Ladrones.

MARIANA,

MARIANA, Juan de, in *Biography*, a celebrated historian, was born at Talavera in 1536. He was an illegitimate child of Juan Martinez de Mariana, afterwards canon and dean of the collegiate in that town. He received an excellent introductory education, and was ſent at a proper age to Alcala, an univerſity of conſiderable reputation. Soon after this Ignatius Loyola ſent miſſionaries into Caſtile to eſtabliſh his order there, and Mariana, who was only in his ſeventeenth year, joined them. At the age of twenty-four he was appointed to the profeſſorſhip of theology at the great college lately eſtabliſhed at Rome. Here he lectured four years, and had among others the famous Bellarmine as one of his pupils. From Rome he went to Sicily to open a courſe of theology which the company had begun there. After a reſidence of two years in that iſland, he was ſent to Paris in the ſame capacity, where for five years he publicly expounded Aquinas, and the degree of doctor was, on account of his great learning, conferred upon him. Not having his health at Paris, he obtained permiſſion to reſign his chair and retire to Toledo, where he was elected to various high offices in the church, and was employed by the archbiſhop in forming a catalogue of prohibited books, and the Index Expurgatorius, which was publiſhed in 1584. About this time he bore a part in the edition of St. Iſidore's works, and incurred ſome ſuſpicion by the freedom with which he eſpouſed the cauſe of Arias Montanus. Mariana had long aſpired to be the hiſtorian of his own country, and in the little leiſure which his ſuperiors left him, he followed the indications of his genius. "Nature," ſays his biographer, "had deſigned him for ſomething better than to expound Thomas Aquinas, and to emaſculate books for the inquiſition. The reſult of his labours appeared in 1592, in a work under the title of "Hiſtoriæ de Rebus Hiſpaniæ Libri xx." It was afterwards extended to thirty books: the moſt complete edition is that of Mentz. The hiſtory comes down to the end of Fernando's reign, the author being fearful of coming nearer to his own times, leſt he ſhould give offence by ſpeaking the truth. The work is in high eſtimation, and it is ſaid that they who read the hiſtory of Spain for entertainment will always read it in Mariana; he is the hiſtorical claſſic of his country. In 1509 he publiſhed his treatiſe "De Rege et Regis Inſtitutione," which was burnt by order of the parliament of Paris. He was author of many other works, the titles of ſeveral of which are enumerated in the "General Biography," ſome of theſe, *viz.* "De Morte et Immortalitate;" and "De Monetæ Mutatione," expoſed him to perſecution, impriſonment, and to thoſe evils that ever attach to a man, whom the higher powers, whether juſtly or unjuſtly, chooſe to ſuſpect. Mariana had, however, a mind not to be borne down by the weight of authority, and could in that privacy and retirement into which he was driven, give up all his powers in the purſuit of ſcience and literature. His laſt publication conſiſted of Scholia upon the Old and New Teſtament, with an elegiac verſion of the Proverbs, Eccleſiaſtes, and Solomon's Song. He died at Toledo on the 16th of February, 1623. "The Jeſuits," ſays Mr. Southey, "have often maintained the rights of the people for the ſake of their own order: this was not Mariana's caſe: his views were of a wider range; he thought of mankind, not of the company."

Mariana, in *Ancient Geography*, a town and Roman colony of Corſica, eſtabliſhed by Marius: it was epiſcopal, and its ruins now bear its name. It is now the ſee of a biſhop; 16 miles S. of Baſtia.

Mariana, in *Geography*, a town of Italy, in the Veroneſe; 8 miles N.N.W. of Verona.—Alſo, a town of Italy, in the department of the Mincio; 15 miles S.W. of Mantua.

MARIANDYNI, in *Ancient Geography*, a people of Aſia, in Bithynia, or extending from Bithynia to Paphlagonia, on the banks of the gulf of Sangarus. Herodotus (l. i. c. 28.) reckons them among the nations ſubdued by Crœſus.

MARIANKA, in *Geography*, a town of Poland, in Volhynia; 44 miles N.N.W. of Zytomiers.

MARIANNA, the name given to a diſtrict of America, granted by the Plymouth council to Capt. John Maſon in 1621. It extended from the river Naumkeag, now Salem, round cape Ann to Merrimack river, and from the ſea to the heads of theſe rivers, with the iſlands lying within three miles of the coaſt.

MARIANO, a town of Italy, in the department of the Olona; 12 miles N. of Milan.

MARIANOPOLI, or Mariupol, a ſea-port town of Ruſſia, on the borders of the ſea of Azof, between the rivers Myus and Calmius. This town, as well as Kherſon or Cherſon, and Catharinenoluf, together with the numerous villages, which have riſen into ſome degree of importance in a country formerly inhabited only by lawleſs banditti, or traverſed by roving hordes, are filled with Ruſſians, with Tartars reclaimed from their wandering life, and with numerous coloniſts, particularly Greeks and Armenians, who migrated from the adjacent provinces of the Turkiſh empire. N. lat. 47°. E. long. 37° 44′.

MARIANOU, a town of Poland, in the palatinate of Braclaw; 48 miles W. of Braclaw.

MARIAQUACO, a town of Braſil, on the river of the Amazons; 36 miles W. of Pauxis.

MARIAS Islands, three iſlands in the North Pacific ocean, occupying a ſpace of about 42 miles. The moſt northern, which is the largeſt of the group, is about 13 miles long in a S.E. by E. and N.W by W. direction, the direction in which the iſlands lie from one another, and about 9 miles broad. It is higheſt towards the S., and gradually deſcends, terminating in a long low point at its N.W. extremity. Its ſhores are compoſed, particularly on the S.W. ſide, of ſteep white rocky cliffs, which kind of ſubſtance forms its principal component part. Notwithſtanding a low kind of ſhrub, with which it is partially covered, it preſents but a dreary and unproductive ſcene. Its S.E extremity terminates alſo, after a deſcent from the ſummit of the iſland, in a low projecting point, with rocks lying from it, as on the oppoſite extremity. On either ſide is a ſmall bay, that on the E. ſide being bounded by a beach, compoſed alternately of rocks and ſand, and affording, by Capt. Vancouver's ſoundings in its vicinity, good anchorage, and protected againſt the general prevailing winds. Between this iſland and the ſecond of the group, called by Dampier "Prince George's iſland," is a paſſage about ſix miles wide, with ſoundings of 20 to 30 fathoms, and ſandy bottom. The S.W. ſide of this latter iſland is bounded by detached rocks, ſome of which deſcend from the centre of the iſland and terminate at the water ſide, in a fine ſandy beach. This iſland abounds more with vegetable productions than the other, but it did not ſeem to afford any ſtreams of freſh water. In ſize and direction Prince George's iſland is next to the former, being about 24 miles in circuit; and the third, or ſouthernmoſt, is about nine miles in compaſs. The moſt valuable production of Prince George's iſland is lignum vitæ, which it yields in great abundance, beſides ſome plants of the orange and lemon kind, and other thorny plants, which reach nearly to the edge of the water. Of birds this iſland

island has great variety, such as hawks, green parrots with yellow heads, parroquets, pigeons, and doves, and small birds of beautiful plumage; but no quadrupeds were seen. On the shores great numbers of fish were observed, and among them some very bold and daring sharks. A few snakes and guanoes were seen; but no traces of human visitors were perceived; though on shore some drift wood was found, which appeared to have been wrought with European tools. Capt. Vancouver's anchoring place lay in N. lat. 21° 28'. E. long. 253° 54'.

MARIASTAIN, a town of Austria; 14 miles S S.W. of Steyr.

MARICA, in *Botany*, an old name for something of the *Iris* kind. Ambrosinus thinks it a corruption of *Naronica*, which was derived from the Naro, a Dalmatian river, about whose banks the best Iris or Orris roots were plentifully produced. The name is retained by Schreber for the *Cipura* of Aublet. Mr. Gawler, now Ker, who has referred to this same genus some additional species, separated from *Iris*, *Moræa* and *Sisyrinchium*, properly follows Schreber in the name; but enquires, in Curt. Mag. p. 646, why *Cipura* was rejected. We presume that as Aublet has given no explanation of its meaning, and nothing is to be guessed from any part of his description, Schreber judged it, at any rate, a hybrid, if not a barbarous, name; and he was too critical a scholar, as well as too faithful a Linnæan, to admit such in general. How he would justify his own barbarous and uncouth *Bambusa*, for what Jussieu has properly called *Nastus*, we will not venture to guess. See BAMBUSA, NASTUS and CIPURA.—Schreb. 37. Willd. Sp. Pl. v. 1. 246. Mart. Mill. Dict. v. 3. Gawl. in Sims and Kon Annals of Bot. v. 1. 244. Curt. Mag. 654. Ait. Hort. Kew. ed. 2. v. 1. 122. (Cipura; Aubl. Guian. 38. Juss. 58. Lamarck Illustr. t. 30) Class and order, *Triandria Monogynia*. Nat. Ord. *Ensatæ*, Linn. *Irides*, Juss.

Gen. Ch. *Cal.* Spathas of one or two valves, single-flowered, enclosed in a common involucrum of two valves. *Cor.* superior, regular, in six deep spreading segments, united into a tube; the three inner alternate ones smaller. *Stam.* Filaments three, distinct, inserted into the mouth of the tube, very short; anthers oblong, erect, longer than the filaments. *Pist.* Germen inferior, oblong, obscurely triangular; style simple, triangular, its angles opposite to the stamens; stigmas three, longer than the style, variously shaped, more or less cohering in a triangular figure. *Peric.* Capsule oblong, bluntly triangular, coriaceous, of three cells and three valves, as if peeled at the top. *Seeds* numerous, in two rows, roundish, somewhat angular.

Eff. Ch. Corolla superior, in six deep segments; the three inner ones smallest. Stamens opposite to the three angles of the style.

Obs. Mr. Ker now includes in this genus some species with united filaments, which we agree with our late friend Mr. Dryander (in *Ait. Hort. Kew.*) in referring to *Sisyrinchium*; a measure justified, if we mistake not, by the habit of their flowers.

1. M. *Northiana*. Broad-stemmed Marica. Ker in Curt. Mag. t. 654. (Moræa Northiana; Andr. Repos. t. 255. M. vaginata; Redout. Liliac. t. 56.)—Stalk sword-shaped, winged.—Native of the Brazils. It was first known here in the collection of the Hon. Mrs. North, at Farnham castle, who procured it in 1789. The plant is now frequent in hothouses, flowering in spring and summer, being much admired for the beauty of its short-lived petals, whose bases are all elegantly mottled with yellow and deep brownish orange, while the limb of the larger ones is white, of the smaller blue. The *root* is tuberous, with many fibres, and perennial. *Leaves* radical, sword-shaped, dark green, ribbed, two or three feet high. *Flower-stalk* much resembling the leaves, about as tall, though rather narrower, oblique, bearing several successive fragrant *flowers*, about two inches in diameter, from a lateral sheath near the top, sometimes viviparous.

2. M. *martinicensis*. Yellow Martinico Marica. (Iris martinicensis; Linn. Sp. Pl. 58. Jacq. Amer. t. 7. Willd. Sp. Pl. v. 1. 238. Curt. Mag. t. 416. Redout. Liliac. t. 172.)—Stalk round. Leaves linear, flat.—Jacquin found this species in moist meadows among the hills of Martinico, flowering in November and December. Mr. Alexander Anderson sent it from St. Lucia to Kew in 1782. It blooms in the stove with us about May or June, and is perennial; but bearing only small flowers, of an uniform yellow, is not particularly esteemed. The late Mr. Curtis has justly remarked its ill agreement with the character of an *Iris*, and its generic affinity to the foregoing. The *leaves*, however, are narrower, flat, and single-ribbed. *Stalk* slender, round, 12 or 18 inches high, with one or two concave distant *bracteas*. *Flowers* few, successive, very transient, inodorous, about an inch wide. It ripens seeds abundantly, which *M. Northiana* does not.

3. M. *paludosa*. Dwarf Marsh Marica. Willd. Sp. Pl. v. 1. 246. Curt. Mag. t. 646. (Cipura paludosa; Aubl. Guian. 38. t. 13.)—Leaves lanceolate, tapering at each end, plaited. Stalk round. Inner segments of the corolla erect, concave, half the length of the outer.—Native of moist meadows, called savannahs, at the foot of the mountains in Guiana. Mr. A. Anderson sent it from St. Lucia to Kew in 1792. The plant is perennial, flowering in the stove from June to August. Its *leaves* are about a foot high, deep green, lanceolate, tapering much at each end, strongly plaited on each side the midrib. *Flower-stalk* radical, very short, simple, bearing a small tuft of successive, short-lived, white *flowers*, accompanied by a few sheathing scales, and surmounted by a long leafy *bractea* equal to the leaves. The three inner segments of the *corolla* are erect or convoluted, but half the length of the rest, concave, a little recurved at their summits, and tipped with green, so that the whole flower recals the idea of a Snowdrop.

4. M. *plicata*. Small-flowered Marica. Ker in Curt. Mag. t. 655. (Moræa plicata; Willd. Sp. Pl. v. 1. 243. Swartz. Ind. Occ. 82. M. palmifolia; Jacq. Ic. Rar. t. 227. Sisyrinchium palmifolium; Cavan. Diss. 348. t. 19. f. 1. Bermudiana palmæ folio, radice bulbosa; Plum. Ic. 35. t. 46. f. 2.)—Leaves elliptic-lanceolate, with numerous ribs and plaits. Stalk round. Segments of the corolla all nearly equal in length.—Native of Cayenne and the West Indies. Miller is said, in Hort. Kew. ed. 1. v. 3. 305, to have cultivated it at Chelsea, in 1739. Linnæus had specimens, which he confounded with his true *Sisyrinchium palmifolium*, which has a winged stalk, and a dense corymbose tuft of many flowers. We have it not in any of our gardens. *M. plicata* is a tender stove plant, with much broader and more elliptical *leaves*, whose ribs and plaits are much more numerous than *M. paludosa*. The *stalk*, moreover, is almost as tall as the leaves, and the *bractea* proportionably smaller. The *flowers* are small and white, distinguished by all their segments being nearly of equal length, and obovate, though the three innermost are rather the narrowest. They have little beauty to attract general admiration or care.

Mr. Ker comprehends under this genus of *Marica*, besides the above, the *Sisyrinchium palmifolium*, Linn. Mant. 122. Willd.

Willd. Sp. Pl. v. 3. 579, of which no figure, as far as we know, exifts; and the *S. ftriatum*, Sm. Ic. Pict. t. 9. Willd. ibid. 580; though he obferves, in the Annals of Botany, v. 1. 246, that *Sifyrinchium* differs from *Marica* in having united filaments and nearly round (or globofe) capfules. Now we can pofitively affert that the latter fpecies anfwers to this character, befides having the corolla of a *Sifyrinchium*. Its filaments compofe a firm columnar tube, nearly to their very top. As far as we can judge by the fpecimen of *S. palmifolium*, its germen and corolla agree exactly with the *ftriatum*, and we cannot doubt its belonging, as Willdenow obferves, Sp. Pl. v. 1. 244, to the fame genus. A winged or two-edged ftalk feems proper to *Sifyrinchium*. S.

MARICA *Silva*, in *Ancient Geography*, a foreft of Italy, in Campania, which was fituated in the vicinity of the town of Minternæ, towards the mouth of the river Liris.

MARICABAN, in *Geography*, one of the fmaller Philippine iflands, near the S. coaft of Luçon. N. lat. 13° 52'. E long. 120° 56'.

MARICELLO, a town of Naples, in the province of Bari; 6 miles N.W. of Gravina.

MARICHI, in *Hindoo Mythology*, is deemed by fir William Jones, in his differtation on the chronology of the Hindoos, Afiatic Refearches, vol. ii. to be a perfonification of *light*. In the wild theogonies of that poetical race he is made the offspring of Brahma, and father of Kafyapa, the prolific parent of Surya, or the fun, and many other divinities. See KASYAPA, in the feventh line of which article for *all* read *ufe*.

MARICI, in *Ancient Geography*, a people of Italy, in the vicinity of the *Loevi* (which fee), who inhabited a tract now called "Pavefan," watered by the Tefino and the Po.

MARICOLAM, in *Geography*, a town of Hindooftan, in Cochin; 20 miles N.N.E. of Cranganore.

MARI-DSAKE', a lake of Thibet, about 30 miles in circuit. N. lat. 34° 22'. E. long. 88° 50'.

MARIDUNUM, in *Ancient Geography*, a town of the ifle of Albion, belonging to the Demetæ, and fuppofed to have been fituated where Caermarthen, in South Wales, now ftands.

MARIE, STRAITS *of*, in *Geography*, connect lakes Superior and Huron. Near the upper end of thefe ftraits, which are 40 miles long, is a canal navigable by boats. The ftraits afford a pleafing view of various iflands.

MARIE, *St.*, a town of France, in the department of the Lower Pyrenees, feparated from Oleron by a river, and connected with it, at the diftance of two miles, by a bridge of ftone.

MARIE, *St.*, a town on the N.W. coaft of the ifland of Martinico.

MARIE *d'Arnci*, *St.*, a town of France, in the department of Mont Blanc; 15 miles N.W. of Chambery.

MARIE *de la Mer*, *St.*, a town of France, in the department of the Eaftern Pyrenees, near the coaft of the Mediterranean; nine miles E.N.E. of Perpignan.

MARIE *aux Mines*, a town of France, in the department of the Upper Rhine, near which are mines of filver and lead; four miles N.W. of Colmar.

MARIE *du Mont*, a town of France, in the department of the Channel; four miles N. of Carentan.

MARIE, *Cape Dame*, the W. point of the ifland of St. Domingo, which, with Cape Nicholas, forms the entrance of the bay of Leogane. N. lat. 18° 38'. W. long. from Paris 76° 51'. The town of this name, fituated on the Cape, is on the N.W. part of the S. peninfula; 8 leagues W. of Jeremies, and 60 W. of Port au Prince.

MARIE, a town of Hindooftan, in Malwa; 12 miles E. of Seronge.

MARIEBOE, a town of Denmark, in the ifland of Laaland, fituated near a lake abounding in fifh; 12 miles E. of Nafcow. N. lat. 54° 51'. E. long. 11° 32'.

MARIEFRED, a town of Sweden, in the province of Sudermanland, on a bay of the Mælar lake; 25 miles W. of Stockholm.

MARIE-GALANTE, an ifland in the Weft Indies, difcovered by Columbus in the year 1493, of a circular figure and about 42 miles in circumference. It was firft fettled by the French in 1647; and has fince been taken by the Dutch and by the Englifh, but reftored to the French by the Englifh in 1763. This ifland affords a confiderable quantity of tobacco; and contains many grottoes in which are found large crabs, and alfo feveral rivers as well as ponds of frefh water. It is flat on the weftern fhore, and the foil is fit for cultivation. At the time of its laft reduction by the Englifh the annual manufacture of fugar amounted to 1000 hogfheads. N. lat. 16°. W. long. 61° 6'.

MARIENBERG, a town of Saxony, in the circle of Erzgeberg, which has in its vicinity mines of filver, cobalt, iron, vitriol and fulphur. It has a manufacture of fine lace, and a medicinal bath; 34 miles S.W. of Drefden. N. lat. 50° 36'. E. long. 13° 0'.

MARIENBURG, a town of Ruffia, in the government of Riga; 28 miles S. of Verro.—Alfo, a town of Tranfilvania, called alfo *Foldmar*; fix miles N. of Cronftadt. N. lat. 46° 2'. E. long. 45° 14'.—Alfo, a town of Pruffia, denominated alfo *Mallorg*, which is the capital of a prefecturate fituated on the Viftula. It was formerly the chief place belonging to the Teutonic knights. It was once and again taken by the Swedes; 24 miles S.E. of Dantzic. N. lat. 54° 3'. E. long. 18° 55'.—Alfo, a town of the bifhopric of Hildefheim; five miles S.E. of Hildefheim.

MARIENFELD, a town of Germany, in the bifhopric of Munfter; 11 miles E. of Warendorf.

MARIENGAUL, a town and lake of Ruffia, in the government of Polotfk; 40 miles N.E. of Rezitfa.

MARIENHAVE, a town of Eaft Friefland; nine miles N. of Embden.

MARIENSTERN, a town of Upper Lufatia; nine miles W. of Budiffen.

MARIENWALDE, a town of Brandenburg, in the New Mark; fix miles N.W. of Woldenberg.

MARIENWERDER, a town of Pruffia, in the province of Oberland, fituated on the fmall river called the *Leibe*, not far from the Viftula. This town, which was firft built in the year 1233 on a werder, or fmall ifland, called "Quidzin," but foon after rebuilt in its prefent fituation, was occupied by fome grand mafters of the Teutonic order. The cathedral, erected in the 13th century, is the largeft church in the kingdom of Pruffia, and feems by its ftrong breaft-works to have been intended for a fortrefs. The palace is a fpacious edifice, conftructed in the Gothic ftyle, and is furrounded by a pleafant country of varied furface. The inhabitants of this town carry on a confiderable trade with their neighbours. It has been often damaged by inundations, fire, and war. The famous league formed againft the knights of the Teutonic order was concluded here in 1440; 35 miles S. of Dantzic. N. lat. 53° 43'. E. long. 18° 42'.

MARIENZELL, a town with a convent in the archduchy of Auftria; the convent has a celebrated image of the Virgin; fix miles W.S.W. of Baden.

MARIES, St., La, a town of France, in the department of the Mouths of the Rhone, on an ifland formed by the divided ftream of the Rhone, near the fea; 16 miles S. of Arles. N. lat. 43° 27′. E. long. 5° 31′.

Maries, *Three*, three defert iflands in the Pacific ocean, near the weft coaft of Mexico; the largeft of which is about 21 miles in circumference. They abound in hares, guanocs, pigeons, &c., and the coafts with turtles and fifh. N. lat. 21° 30′.

MARIESTADT, a town of Sweden, in Weft Gothland, built by Charles IX. on the rivulet Tidla, where it falls into the Wenner lake. The houfes are moftly built of wood, and painted of a red colour; 80 miles N.E. of Gotheborg. N. lat. 58° 27′. E. long. 13° 38′.

MARIETTA, a town of America, in the ftate of Ohio and county of Wafhington, fituated at the confluence of the Mufkingum with the Ohio. It is laid out, on a delightful plain formed by the banks of the two rivers, into 1000 houfe-lots, with 90 feet in front by 180 feet in the rear, with fuitable open fquares, referved for ufe, ornament and pleafure. Its ftreets interfect one another at right angles. It derives its name from Marie Antoniette, the late queen of France, and was fettled in April 1788, and incorporated in 1800. In 1803 it contained 550 inhabitants and 91 dwelling-houfes, befides eight merchants' ftores, 19 buildings occupied by public officers and mechanics, three rope walks, a gaol, a court-houfe, and an academy ufed as a place of worfhip. This town is rapidly increafing in population, wealth, and elegance. Its fituation is delightful; it is environed by high hills, fome of which are covered with trees, and others afford excellent ftone for building. The vales and lower grounds are extenfive and very fertile. Within the limits of the town are thofe ancient forts, on the bank of the Mufkingum, which have furnifhed the curious with fubjects of diligent inveftigation. N. lat. 39° 25′. W. long. 81° 30′. Harris's Tour.

MARIGNANO, a town of Italy, in the department of the Olona; 11 miles S.E. of Milan.

MARIGNIA, in *Botany*, a name given by Commerfon to a fort of baftard rofin tree, of the Mauritius, which Juffieu reduces to *Burfera*, though it has five petals and ten ftamens, with a coriaceous, not pulpy, fruit. See Bursera.

MARIGNY, in *Geography*, a town of France, in the department of the Channel, and chief place of a canton, in the diftrict of St. Lô; fix miles W. of St. Lô. The place contains 1260, and the canton 7918 inhabitants, on a territory of 102½ kiliometres, in 12 communes.—Alfo, a town of France, in the department of the Indre and Loire; 15 miles S.W. of Chinon.—Alfo, a town of France, in the department of Mont Blanc; 20 miles S.S.E. of Geneva.

MARIGONDON, a town fituated on the W. coaft of the ifland of Luçon. N. lat. 13° 8′. E. long. 123° 20′.

MARIGOT, a town of the ifland of Martinico; nine miles N.W. of Cul de Sac de la Trinité.

MARIHABAG, a town on the E. coaft of Mindanao. N. lat. 8° 48′. E. long. 126° 12′.

MARIKINA, in *Zoology*, the name given by Buffon to the Simia *Rofalia*; which fee.

MARILA, in *Botany*, Swartz. Prod. 84. Schreb. 806. Mart. Mill. Dict. v. 3. This genus, confifting of a fingle fpecies only, *M. racemofa*, a Weft Indian fhrub, was adopted by Swartz from the manufcripts of Solander. The name feems taken from μαριλη, *live embers* or *fparks*; but we cannot tell whether it alludes to the "elegantly tranfparent" dots and lines in the foliage, or to the fparkling yellow pellicle and fringe which is faid to accompany the feeds. We are moft inclined to fuppofe the former; but the matter is of little importance, as this genus is reduced by Dr. Swartz himfelf, in his Fl. Ind. Occid. 963, to the *Bonnetia* of Schreber, which is Aublet's *Mahurea paluftris*. We think it not advifable to change the fpecific name of this laft, to the far lefs eligible one of *meridionalis*, though the other fpecies is likewife found in wet fituations.

Bonnetia being omitted in its proper place, we fubjoin its characters. This genus was fo called by Schreber, in honour of the celebrated Charles Bonnet of Geneva, who died in 1793, aged 73, and who has diftinguifhed himfelf by various phyfiological and fpeculative works in natural hiftory. His enquiries concerning the ufe of leaves entitle him to botanical commemoration, though he was no adept in the practical or fyftematic departments of the fcience. Schreb. 363. Willd. Sp. Pl. v. 2. 1213. Mart. Mill. Dict. v. 1. Swartz Ind. Occ. 963. (Marila, as above. Mahurea, fee that article.) Clafs and order, *Polyandria Monogynia*. Nat. Ord. *Columniferæ*, Swartz; uncertain, Juff.

Gen. Ch. *Cal.* Perianth inferior, of five oblong, concave, rather unequal leaves. *Cor.* Petals five, ovate, obtufe, concave, longer than the calyx, two of them rather larger and more fpreading than the reft. *Stam.* Filaments very numerous, inferted into the receptacle, fhorter than the corolla, thread-fhaped, a little dilated upwards; anthers oblong. *Pift.* Germen fuperior, oblong; ftyle thickifh, incurved, the length of the germen; ftigma obtufe, fomewhat capitate. *Peric.* Capfule oblong, columnar, of three or four cells, and three or four acute valves, whofe inflexed margins are inferted into the angles of the central column. *Seeds* very numerous, imbricated, minute, oblong, each enveloped in a fringed coloured membranous tunic.

Eff. Ch. Calyx of five leaves. Petals five. Capfule fuperior, of three or four valves, and as many cells. Seeds numerous, imbricated, each in a membranous coloured tunic.

1. B. *paluftris*. Vahl. Eclog. v. 2. 42. (B. meridionalis; Sw. Ind. Occ. 967. Mahurea paluftris; Aubl. Guian. v. 1. 558. t. 222.)—Leaves alternate Clufters terminal.—Native of marfhes in Cayenne and Guiana, flowering in Auguft, and bearing fruit in October. A *tree* of moderate fize, with a foft white wood. *Leaves* alternate, ftalked, oval, three or four inches long, entire, fmooth, veiny. *Flowers* racemofe, purplifh.

2. B. *racemofa*. Swartz Ind. Occ. 965. (Marila racemofa; Prod. 84.)—Leaves oppofite. Clufters axillary.—Native of the banks of rivers in the Weft Indies. A tall *fhrub*, with many *ftems*. *Leaves* eight or ten inches long, lanceolate, acute, finely veined, and full of pellucid dots and lines, which are beautifully confpicuous when feen againft the light. *Footftalks* half an inch long. *Stipulas* none. *Flowers* greenifh-white, in fimple axillary clufters, half as long as the leaves. *Petals* very fhort-lived. *Capfule* an inch long.

MARILHOSA, in *Geography*, a town of Portugal, in the province of Alentejo; 18 miles E N.E. of Mourao.

MARIM, a river of Brazil, which difcharges itfelf into the Atlantic, S. lat. 2° 25′. W. long. 44° 46′.

MARIMATA, a town of Arabia, in the province of Oman; 90 miles S.W. of Mafkat.

MARIN Fabrice, in *Biography*, a French compofer, who fet the fongs of Ronfard, Baif, Jamier, and Defpertes, in in four parts, which were printed and publifhed at Paris in 1578, by Adrian le Roy.

MARIN, *Monfieur, ci-devant compte*, a great dilettante mufician, and a performer on the Pedal-harp, in the moft fingular and mafterly ftyle, perhaps, at which any other performer on that inftrument ever arrived. His modulation, paffages, and ftrokes of genius in the mufic which he plays, whether written or extempore, feem the effufions of a bard infpired;

> "Who with a mafter's hand and prophet's fire,
> Strikes the majeftic concords of his lyre."

The whole of his performance is unlike any other mufic but the voluntaries of a great organift. It can only therefore be truly enjoyed by mafters and deep muficians. It may furprize, but cannot delight the public. It is not fo amiable, or indeed fo fit, for a female to attempt as the exquifite performance of madame Krumpholtz. But it fhews the extent of the inftrument's powers, as well as the performer's abilities, greatly to furpafs whatever was heard before, or thought poffible for genius and diligence to attain.

M. Marin, we believe, was the firft who accompanied his elèves on the fame inftrument, after the manner of a duet on one piano-forte, by ftanding behind them and picking out notes in fuch parts of the clavier as are unoccupied by the principal performer. This expedient was not put in practice for want of abilities to accompany them on any other inftrument; as, if he was not fuperior to all other performers on the harp, he would be called an exquifite player on the violin, upon which inftrument, though many may exceed him in execution, there are very few that are equal to him in expreffion. Almoft every year produces a mufical phenomenon of fome kind or other; and M. Marin was certainly the phenomenon of his time among harpifts wherever he went.

MARIN, in *Geography*, a fmall ifland of Ruffia, in the Baltic; 72 miles N. of Riga. N. lat. 58° 10'. E. long. 24°.

MARINA, a town of Africa, in Kaarta; 15 miles N. of Kemmoo.—Alfo, a town of the ifland of Cyprus, on the S. coaft; four miles S. of Lernica.

MARINDUGERA, or MARINDIQUE, one of the Philippine iflands, near the S. coaft of Luçon, about 60 miles in circumference; 30 miles N.E. of Mindoro. N. lat. 13° 29'. E. long. 12 51'.

MARINE CHAIR, is a contrivance of Mr. Irwin, for facilitating the neceffary obfervations, in order to determine the longitude at fea. It is faid that Mr. Irwin, on a trial of this machine, found the longitude within twenty-three miles, or about one-third of a degree. See LONGITUDE.

MARINE *Clothing Room*, in a *Ship*, an apartment built in the after platform on the larboard fide, to receive the clothing ufed by the marines.

MARINE *Infurances*. See *Marine* INSURANCES.

MARINE *Law* See LAW.

MARINE *Remains*, a term ufed by many authors to exprefs the fhells of fea-fifhes, and parts of cruftaceous and other fea-animals, found in digging at great depths in the earth, or on the tops of high mountains. Their being lodged in thefe places, is an evident and unqueftionable proof of the fea's having once been there, fince it muft have covered thofe places where it has left its productions It has been a favourite fyftem with many, and particularly with the late Dr. Woodward, that all thefe marine bodies were brought to the places where they now lie, by the waters of the univerfal deluge; which, as we are informed by holy writ, covered the whole furface of the globe, and even the higheft mountains. (See DELUGE.) But though this is a very ready expedient to account for many of the natural phenomena, yet there are evident proofs that it cannot have been the caufe of all that is attributed to it; and there muft neceffarily have been fome other caufe of many of thefe remains having been placed where we now find them. Neither does the opinion of fome particular authors, that partial inundations of different places have left thefe marine bodies behind them at the recefs of the waters, feem fufficient to account for the multitudes of thefe remains, many of which we find thrown upon places inacceffible to fuch floods. Moro, de Cruftaceis in Montib. deprehenf.

Signior Moro has attempted to account for thefe phenomena on a new plan of reafoning. He obferves that it is the beft bafis of argument to begin from facts: and that if we can certainly find how fome part of thefe animal remains come to be depofited at fuch great diftances from their natural refidence, we may very rationally conclude, that by the fame means, be they what they will, all the reft were alfo brought thither. He adds, that the earth, once the bottom of the fea, or the level furface of a plain, may be, and frequently has been, in the memory of man, raifed up into a mountain by fubterranean fires, earthquakes, and volcanoes. He mentions the famous inftance of the new ifland raifed out of the bottom of the fea near Santorini in the year 1707, which became of a circumference not lefs than fix miles, and of the new mountain raifed near Puzzoli in 1538.

Thefe, and many other like facts, prove that the origin of mountains and iflands may have been fuch, and that the matter they confift of may have been the fame with what was once the bottom of the fea; and that the marine bodies found in thefe mountains, were fuch as were living, or remaining of living fifh at the time when the ifland or mountain were fo raifed above the furface of the water which before covered it.

This is no new opinion; but this author has fet it in a new and much ftronger light than ever it had appeared in before, by the inftances and examples he has brought in proof of it. Some have been fond of believing that the bodies we call marine remains, were never indeed any parts of living animals, but that they are merely *lufi naturæ* formed in the places where they are found; but Fabius Columna proved this to be an error, fhewing that the fhark's teeth, or gloffopetræ of the ifland of Malta, when calcined by a ftrong fire, yielded afhes the fame with thofe from animal bodies, and by no means of the fame nature with thofe produced from calcined ftones.

That changes of parts of the bottom of the fea into dry land, have often been made, is proved not only from the late known inftances, but from the teftimonies of Strabo, Pliny, and other writers of credit: and nothing is more obvious to reafon, than that in the fudden rife of fuch parts of the bottom of the fea, all its contents, all the fhells, and other hard parts of fifhes lying there, would be carried up with it.

As fome mountains and fome iflands muft have certainly been produced in this manner, it is not impoffible but that all of them may have been fo; and there is no more than this required to account clearly and evidently for all the vaft profufion of marine bodies at land as we find them, without having recourfe to the improbable means of the univerfal deluge, which, for many plain reafons, cannot have been the caufe; or to the effects of particular inundations, which muft have been wholly incapable of lodging many of them there. The lodgment of fhells in the folid ftrata of mountains, is better accounted for by this fyftem of fignior Moro than any other; and if it be afked why fome mountains afford them in great plenty,

plenty, and others not at all, it will be not difficult to anſwer, by obſerving, that among the mountains of the more known parts of the world, ſome conſiſt of mere ſolid rock, and others of various ſtrata of earthy and other matter; that the firſt of theſe may be ſuppoſed primary or natural mountains, and the other ſecondary or accidental ones: and that theſe marine remains are always wanting in the former, and uſually are found in the latter, which is a fact greatly favourable to this ſyſtem.

There are many difficulties attending the accounts of all authors of the formation of the earth, and the lodging of theſe bodies in it; nor is this laſt ſyſtem without difficulty. The cauſes here aſſigned as to the origin of mountains and iſlands, doubtleſs have been ſo in regard to ſome, but ſcarcely to all; and the bodies here treated of are ſo numerous, in ſome particular places, that ſcarcely any account can ſolve the difficulty of their being collected together in ſo ſtrange a manner. See *Adventitious* Fossils, and *Theory of the* Earth.

Marine *Salt.* See Salt.

Marine *Surveyor*, is the name of a machine contrived by Mr. H. de Saumarez, for meaſuring the way of a ſhip in the ſea. This machine is in the form of the letter Y, and is made of iron or any other metal. At each end of the lines which conſtitute the angle or upper part of that letter, are two pallets, not much unlike the figure of the log; one of which falls in the ſame proportion as the other riſes. The falling or pendent pallet meeting a reſiſtance from the water, as the ſhip moves, has, by that means, a circular motion under water, which is faſter or ſlower, according as the veſſel moves. This motion is communicated to a dial within the ſhip, by means of a rope faſtened to the tail of the Y, and carried to the dial. The motion being thus communicated to the dial, which has a bell in it, it ſtrikes exactly the number of geometrical paces, miles, or leagues, which the ſhip has run. Thus the ſhip's diſtance is attained; and the forces of tides and currents may alſo be diſcovered by this inſtrument; which, however, has been very little uſed. See a large account of it in the Abr. Phil. Tranſ. vol. vi. p. 444, &c.

MARINES, in *Geography*, a town of France, in the department of the Seine and Oiſe, and chief place of a canton, in the diſtrict of Pontoiſe; ſeven miles N.W. of Pontoiſe. The place contains 1232, and the canton 13,814 inhabitants, on a territory of 295 kiliometres, in 39 communes.

Marines, or *Marine Forces*, a body of troops employed in the ſea-ſervice, under the direction of the lords of the admiralty. Theſe marines compoſe certain regiments trained to the different modes of ſea-fighting, and made uſeful alſo in ſome of thoſe manœuvres of a ſhip, where a great number of hands is required. The preciſe time when this inſtitution firſt took place, is, like many other parts of military hiſtory, involved in obſcurity. The oldeſt corps of this kind, which Groſe has been able to diſcover, was the third regiment of infantry in the liſt of the army for the year 1684. It then conſiſted of 12 companies, without grenadiers. The men were clothed in yellow coats, lined with red; their colours were a red croſs, with rays of the ſun iſſuing from each of its angles. This was not the preſent third regiment, now diſtinguiſhed by the name of the old buffs, which then ſtood the fourth on the liſt. In the reign of king William III. there were ſeveral marine regiments. In the beginning of the reign of queen Anne ſix regiments of marines were raiſed: theſe regiments have been very uſeful, more eſpecially upon fitting out ſquadrons of ſhips for an immediate expedition; for as they are conſtantly quartered, when not at ſea, as near the principal ports as poſſible, *viz.* Plymouth, Portſmouth, and Chatham, they were very eaſily put on board ſuch ſhips as had moſt occaſion for them: for they were under the immediate direction of the admiralty: and rules and inſtructions for their better government were ſettled by his majeſty in council, July 1, 1702. In the war preceding the peace of 1748 there were 10 regiments of marines, which were diſbanded about the year 1749: theſe were under the direction of the lords of the admiralty, and when aſhore were quartered in the neighbourhood of the docks and ſea-ports. In 1755 a number of companies of marines were raiſed, under the direction of the ſecretary of war; they were afterwards formed into three diviſions, and ſtationed at the towns of Plymouth, Portſmouth, and Chatham; and at each of theſe places have now convenient barracks. Theſe companies, A. D. 1761, being 130 in number, were, from the time of their eſtabliſhment, put under the immediate direction of the lords of the admiralty. At the peace many of them were reduced; and in 1770 there remained only 70 companies; but in the year 1782, they were increaſed to 150. The marines are clothed and armed in the ſame manner as his majeſty's other corps of infantry. Their uniform is ſcarlet, faced with white, white linings, waiſtcoats and breeches; they alſo wear caps, like thoſe of the fuſileer regiments. Their pay is the ſame with that of the marching regiments of foot. There are annual acts for the better governing of his majeſty's royal marine forces whilſt on ſhore; which are much the ſame with thoſe that reſpect the land-forces, only with ſome variations on account of their being ſubject to the juriſdiction of the admiralty. Thus, the lord high admiral, or three commiſſioners of the admiralty, are to form articles of war, and grant commiſſions for holding courts-martials. Notice of a deſerter being apprehended is to be ſent to the ſecretary of the admiralty. The billeting, and carriages, are to be in purſuance of orders from the admiralty.

MARINER, the ſame with ſeaman or ſailor.

The mariners of a ſhip are accountable to the maſter; the maſter to the owners; and the owners to the merchant, for all damages by negligence, or otherwiſe. If a mariner be hired, and he deſerts the ſervice before the voyage is ended, by the law marine, and by common law, he ſhall loſe his wages; and if a ſhip is loſt by tempeſt, &c. the mariners loſe their wages, as well as the owners their freight; and this is to oblige them to uſe their utmoſt endeavours to preſerve the ſhip.

Perſonating mariners, and receiving their wages, and forging letters of attorney, &c. or falſely taking out letters of adminiſtration for the receipt of ſeamen's wages, is felony without benefit of clergy. See Forgery and *Greenwich* Hospital.

Concerning ſeamen in the merchant ſervice, it is enacted by 2 Geo. II. c. 36. that no maſter of a ſhip ſhall proceed on a voyage, without agreeing in writing with ſuch mariner (apprentices excepted), to be ſigned by ſuch mariner, for wages; and by 31 Geo. III. c. 39 the ſame is extended to ſeamen employed in the coaſting trade, on pain of 5*l.* for each mariner, on conviction before one juſtice, by the oath of one witneſs, to be levied by diſtreſs. (See alſo 37 Geo. III. c. 73.) If the mariner deſert after he hath ſigned the agreement, he ſhall forfeit the wages due to him at the time of deſerting; and on application from the maſter, owner, or commander of the ſhip, ſuch juſtice may cauſe him to be apprehended; and if he ſhall refuſe to proceed on the voyage, without ſufficient reaſon to the ſatisfaction of the juſtice, the ſaid juſtice ſhall commit him to the houſe of correction, for not exceeding 30 nor leſs than 14 days. (2 Geo. II. c. 36.

c. 36. 31 Geo. III. c. 39. 45 Geo. III. c. 31.) For forfeitures to *Greenwich* Hospital, and privilege of admiſſion, ſee that article. The maſter of the ſhip ſhall pay the ſeaman's wages, if demanded, in 30 days after the ſhip is entered in the cuſtom-houſe, or at the time of diſcharge, which ſhall firſt happen, deducting out of ſuch wages the aforeſaid forfeiture; on pain of 20*s.* to ſuch ſeaman, to be recovered in like manner as his wages. (2 Geo. II. c. 36. 31 Geo III. c. 39.) By 44 Geo. III. c. 13. it is enacted that petty officers or ſeamen, arreſted by ſheriffs or other officers, ſhall be kept in cuſtody after being entitled to a diſcharge from any proceſs; and be conveyed to the commander-in-chief, or ſome commiſſioned officer, to ſerve on board his majeſty's fleet. And the ſheriff, gaoler, or other officer, ſhall be paid by the treaſurer of the navy, upon producing a certificate for conducting ſuch ſeaman at the rate of 2*s. per* mile. The transfer of ſuch ſeaman ſhall be certified upon the back of the proceſs. If any ſheriff, &c. ſhall neglect ſo to convey ſuch ſeaman, he ſhall be liable to an action of treſpaſs at the ſuit of ſuch petty officer, &c. or ſeaman. If any ſheriff, &c. ſhall ſuffer any ſuch ſeaman, &c. to eſcape, he ſhall be liable to the penalty of 100*l* recoverable in any of the courts of record at Weſtminſter; one moiety to the king, and the other to the party ſuing. Any action by virtue of this act, muſt be brought within three months after the ſuit; and if the plaintiff fail in ſuch action, the defendant ſhall have treble coſts. By 37 Geo. III. c. 73. to prevent the deſertion of ſeamen from merchant ſhips, every ſeaman who ſhall deſert during the voyage, either out or home, from any Britiſh merchant ſhip, trading to or from his majeſty's colonies in the Weſt Indies, ſhall, over and above all puniſhment, penalties, and forfeitures, to which he is now ſubject, forfeit all the wages he may be entitled to from the maſter or owner of the ſhip, on board of which he ſhall enter immediately after ſuch deſertion. And every maſter or commander of any ſhip, who ſhall engage any ſuch perſon, knowing him to have deſerted from any other ſhip, ſhall forfeit 100*l.* In the act above cited there are ſeveral other proviſions and regulations relating to ſeamen in the merchant ſervice. By 35 Geo. III. c. 28. c. 95. petty officers, ſeamen, boatſwain, gunners, &c. may allot a certain part of their monthly pay for the maintenance of wives and children, or mothers. And by 37 Geo. III. c. 53. an increaſe of wages is made to ſuch perſons, and they are empowered to allot a part of ſuch pay, to be calculated as nearly as may be to equal one half of it. All petty officers, ſeamen, marines, &c. who may be wounded in action with the enemy, ſhall receive their full wages until their wounds are healed; or until (being declared incurable) they ſhall receive a penſion from the cheſt at Chatham, or be admitted into Greenwich hoſpital. (See alſo 46 Geo. III. c. 127.) All allotments of wages are to be paid without deductions, on penalty of 20*l.*

Mariners wandering up and down, and who ſhall not ſettle themſelves to work, or have not a teſtimonial under the hand of a juſtice, ſhewing where they landed, and whither to go, &c. or having ſuch teſtimonial, if they exceed the time limited more than fourteen days, not being ſick in their paſſage home, &c. are guilty of felony by 39 Eliz. cap. 17. This ſanguinary law, though in practice deſervedly antiquated, ſtill remains a diſgrace to our ſtatute-book; yet attended with this mitigation, that the offender may be delivered, if any honeſt freeholder, or other perſon of ſubſtance, will take him into his ſervice, and he abides in the ſame for one year; unleſs licenſed to depart by his employer, who, in ſuch caſe, ſhall forfeit 10*l.* But if they cannot work, for want thereof, the two next juſtices, upon their complaint, ſhall take order that they may be provided of work; or otherwiſe may tax the whole hundred, till relief ſhall be had. (Stat. ibid.) And every pariſh may be charged for relieving mariners, as for maimed ſoldiers; and they ſhall be relieved by the treaſurer of the county, &c. (43 Eliz. cap. 3.) The probate of the will, or letters of adminiſtration, of any common ſoldier, or ſeaman, who ſhall be ſlain or die in the ſervice, ſhall be exempted from the ſtamp duties; a certificate being produced from the captain under whom he ſerved, at the time of his death, and oath made of the truth thereof, before the proper judge or officer, for which oath no fee ſhall be taken. 5 Will. c. 21.

In order to facilitate the returns of marines and ſailors, as well as ſoldiers, when diſcharged, to their reſpective places of legal ſettlement in England, and to prevent their being deemed rogues and vagabonds, and puniſhed as vagrants, it is provided by the 43 Geo. III. c. 61, that, carrying their diſcharge, within three days from its date, to the mayor or chief magiſtrate of the city, town, port, or corporate place neareſt to, or within 15 miles from, the place of their diſcharge, they ſhall receive from ſuch magiſtrate a certificate ſtating the place to which the perſons ſo diſcharged are deſirous of going, being their home or legal place of ſettlement, together with the time to be fixed, not exceeding ten days for every 100 miles, and ſo in proportion, except for a reaſonable cauſe to be expreſſed in ſuch certificate; and ſuch perſon producing ſuch diſcharge and ſuch certificate, when lawfully demanded, and being in his route accordingly as to time and road, ſhall not, by reaſon of aſking relief, be deemed to be a rogue or vagabond; provided ſuch diſcharge bear the true date, both as to the time when, and place where it was given, and ſhall expreſs the ſum or ſums, if any, which were paid to ſuch ſoldier or ſailor at ſuch time and place. New certificates are to be affixed to the former in caſe of delay from accident or ſickneſs. And all certificates or paſſes granted as heretofore from the office of admiralty, or war-office, to diſcharged ſailors, ſoldiers, or marines, or to the families of ſuch, ſerving abroad, or lately deceaſed, to carry them to their reſpective homes, ſhall have the ſame effect and force to all intents and purpoſes whatſoever as the certificates herein permitted to be given by the magiſtrate as aforeſaid; and the terms of the ſame may be extended, &c.

By the 22 Geo. II. c. 44. all officers, marines, and ſoldiers, who have been employed in his majeſty's ſervice, and not deſerted, may ſet up and exerciſe ſuch trades as they are fit for in any town or place within Great Britain or Ireland, (except Oxford and Cambridge), and if they ſhall be ſued thereupon they ſhall have double coſts.

By 31 Geo. II. cap 10. no ſeaman aboard his majeſty's ſhip can be arreſted for any debt, unleſs the ſame be ſworn to amount to at leaſt 20*l.*

The method of ordering ſeamen in the royal fleet, and keeping up a regular diſcipline there, is directed by certain expreſs rules, articles, and orders, firſt enacted by the authority of parliament, ſoon after the Reſtoration (13 Car. II. ſtat. 1. cap. 9.); but ſince new-modelled and altered, after the peace of Aix-la-Chapelle, (22 Geo. II. cap. 23, amended by 19 Geo. III. c. 17.) to remedy ſome defects, which were of fatal conſequence in conducting the preceding war. In theſe articles of the navy, almoſt every poſſible offence is ſet down, and the puniſhment thereof annexed: in which reſpect the ſeamen have much the advantage over their brethren in the land-ſervice; whoſe articles of war are not enacted by parliament, but framed from time to time at the pleaſure of the crown. For theſe articles, ſee Navy.

Mariners'-*Compaſs.* See Compass.

MARING, in *Geography*, a town of Pruffia, in the province of Ermeland; 10 miles W.S.W. of Allenftein.

MARINGANDO, a town on the W. coaft of Madagafcar. S. lat. 13° 50'. E. long. 48° 30'.

MARINGUES, a town of France, in the department of the Puy-de-Dôme, and chief place of a canton, in the diftrict of Thiers; 14 miles N.W. of Clermont. The place contains 3800, and the canton 7586 inhabitants, on a territory of 82½ kiliometres, in four communes.

MARINHA, St., a town of Portugal, in the province of Beira; 23 miles S.E. of Oporto.

MARINI, Giambattista, in *Biography*, known generally by the name of *Il Cavaliere Marini*, an Italian poet, was born at Naples in 1569. His father was a counfellor of eminence, and was defirous of bringing up the young man to his own profeffion, but was unable to overcome the repugnance to legal ftudies, which an early attachment to poetry produced in him, as it has done in fo many others. His father would not be appeafed at the difappointment which he felt in the fon's refufal to acquiefce in his wifhes, and expelled him from his houfe. For a fhort time he obtained an afylum with a perfon of rank, till a juvenile mifdemeanor caufed him to be committed to prifon. On recovering his liberty, he went to Rome, and was introduced to cardinal Peter Aldobrandini, with whom he lived fome years, and whom he accompanied to Ravenna and Turin. At the laft city he rendered himfelf confpicuous by his talents and learned warfare with feveral literary antagonifts; of thefe, the one moft noted was Gafpar Murtola, a Genoefe, who, jealous of Marini's reputation, and of his having been honoured with knighthood, attacked him in fonnets and lampoons. Marini was not behind hand in taking his revenge, and was fo fevere in his "Murtoleide," that the enraged poet attempted to affaffinate him in the ftreets of Turin: he miffed his rival, and wounded a favourite of the duke, who ftood by his fide. For this act Murtola would have been hanged, had not Marini interceded with the duke for his life. After this, Marini's enemies gained the advantage over him, and obtained an order for his imprifonment. Upon his liberation, he went to France in 1615, whither he had been invited by queen Margaret. Before he arrived, his patronefs was dead, but he met with a fteady friend in queen Mary of Medicis, who fettled upon him a liberal penfion. In France, he publifhed his moft famous poem, the "Adone," firft printed in 1623. He returned to Rome, and was elected prefident of the academy Degli Umorifti. He afterwards went to Naples, where he was favourably received by the viceroy, duke of Alva. He died in 1625, at the age of fifty-fix. Befides his "Adone," of which there were many editions, he publifhed, among many other things, "La Strage degli Innocenti;" "La Sampogna;" and a collection of "Letters." He had a lively imagination, and very fertile invention; but is not celebrated for a good tafte; and many of his pieces contain licentious paffages, which, however, when he was near his end, he begged might be expunged in all future editions; but they were too much in the tafte of the age for fuch a facrifice. Moreri.

Marini, in *Geography*, a town of Spain, in New Caftile; 4 miles N.W. of Alarçon.

MARINO, St., a fmall republic of Italy, near the coaft of the Adriatic fea, between Romagna and Urbino, in N. lat. 43° 55'; the territory of which is confined to a mountain, with a diminutive tract at the foot of it. The number of inhabitants is eftimated at between five and fix thoufand; and it has been their happy lot to enjoy freedom and tranquillity for more than thirteen centuries with little interruption. Surrounded by the dominions of the pope, they have claimed his protection. The founder of this inconfiderable ftate was St. Marino, a Dalmatian by birth, and a mafon by trade. Having finifhed fome repairs of Rimini, in the ninth century, he retired to this fequeftered mountain, where he led the life of a hermit, and fubjected himfelf to all the aufterities of religion. The princefs of the country, it is faid, obferving his extraordinary fanctity, made him a prefent of the mountain; and a number of inhabitants reforting hither, he eftablifhed the republic that has ever fince been diftinguifhed by his name. Their whole hiftory is comprifed in two purchafes made of a neighbouring prince, one the caftle of Pennuenta in 1100, and another, called Cafala, in 1170, and in the affiftance afforded to the pope, Pius II., about 290 years after againft Malatefta, lord of Rimini. In return for this fervice he transferred to them four fmall caftles, together with the village of Piagge. This was the epocha of its higheft grandeur, but now it is reduced to its primary limits. In 1739, the miferable ambition of cardinal Alberoni, difappointed in confiderable projects and embroiling larger ftates, was directed againft this republic, and he fubjected it to the fee of Rome; but on complaints of its council, the pope reftored to it its former freedom and privileges. The government of this ftate confifts of a council of 40, half nobles and half commoners. On very important occafions an arengo, or great council, is convened, to which every family has the privilege of deputing a reprefentative. The principal officers are two captains, who are changed every half year; a commiffioner, who is a foreigner, and who tries civil and criminal caufes; a doctor of laws, whofe office is triennial; and a phyfician, who muft be a foreigner, and who is chofen for three years to attend the fick, and to infpect the fhops of apothecaries. In this republic are three caftles, three convents, and five churches.

Marino, *St.*, the capital of the above defcribed republic, which is an indifferently built town or rather a village, fituated on a rugged hill of difficult accefs, formerly called "Mons Sacer," and well fortified, with only one avenue to it; 10 miles S.W. of Rimini, and as far from the fea-coaft. N. lat. 42° 56'. E. long. 12° 24'.—Alfo, a town of Naples, in Bafilicata; 9 miles S. of Turfi.

MARINONI, John James, in *Biography*, a celebrated mathematician and aftronomer, was born at Udina, in the Frioul, in 1676. He made a rapid progrefs in his education, outftript his contemporaries, and fhewed a decided turn for mathematical ftudies. In 1696, he repaired to the univerfity of Vienna, and obtained the degree of doctor in philofophy. He was foon after this appointed by the emperor Leopold mathematician to the court: in which capacity he fortified the city fo as completely to prevent the incurfions of the rebels, and to put a ftop likewife to the practice of fmuggling, which at that time prevailed. After the death of the emperor, he was taken under the protection of his fucceffor; and by his orders, in 1706, made a furvey of the capital, and its environs, which was engraved, the fame year, in four large fheets. In 1709, Marinoni was appointed engineer of Lower Auftria: in 1714 he invented an inftrument for meafuring fuperficies in an eafy manner, and without the neceffity of calculation. This inftrument he called the planimetre balance, and he dedicated the work, in which its principles were explained and illuftrated, to the emperor Charles VI., which, however, was never printed. In 1717, he formed a plan for the eftablifhment of an academy deftined to teach geometry and the military fciences, which, being approved by the emperor, was immediately carried into execution, and in the following year Marinoni was appointed fub-

fub-director of the new eftablifhment, and in 1719 he received a patent as firft mathematician to his majefty, and in that quality he was fent to the Milanefe to make a furvey of the duchy: a labour on which he was employed three years, and which he accomplifhed to the fatisfaction of his fovereign. In 1726, he was admitted into the clafs of the nobility of the empire, and appointed chief director of the military of the academy. Owing to fome difputes refpecting the limits of the different ftates in confequence of changes which had taken place in the courfes of the rivers, Marinoni was requefted, in 1729, as well by his imperial majefty, as by feveral Italian princes, to refume the difcuffions entered into on that fubject, with the view of bringing them to a conclufion. This undertaking, which required very fine talents, in order to reconcile a multitude of complex interefts, Marinoni completed to the perfect fatisfaction of every perfon concerned. In 1730, he eftablifhed what he called "Specula Domeftica," caufing all the inftruments that he intended to ufe to be conftructed under his own infpection: he was accuftomed to conftruct every thing he ufed, and kept in conftant employment, in his own premifes, artifans of almoft every kind, as printers, engravers, book-binders, &c. By this mode of conduct, he was enabled to form one of the moft complete obfervatories in Europe, and he made obfervations which may be placed in the fame clafs with thofe of the ableft aftronomers. In 1745 he publifhed, and prefented to the fon of Charles VI., a very magnificent work, entitled "De Specula Domeftica." In the following year he was elected a member of the Royal Academy of Sciences at Berlin, on the recommendation of Maupertuis, then prefident; and in 1751, he publifhed a new work, entitled "De Re Ichnographica." He intended to have proceeded with other works which he had planned for himfelf, but death put a clofe to his labours. He died on the 10th of January, 1755. He left behind him thirty-fix volumes of aftronomical obfervations arranged in the beft order. He is faid, during the laft twenty years of his life, to have loft fcarcely a moment of his time. He bequeathed his aftronomical inftruments to the emprefs-queen, who accepted the legacy, and to render it of the greateft utility, prefented it to the univerfity. Gen. Biog.

MARINUM, in *Ancient Geography*, a town of Italy, placed by Strabo in Umbria.

MARIO, in *Ichthyology*, a name given by Pliny, and other of the old Roman authors, to a large fifh allied to the acipenfer or fturgeon. There feems, from all that they have faid of it, great reafon to believe that it was the fifh we at prefent call *hufo*, or the ichthyocolla-fifh, from ifinglafs being made of it. Artedi makes this a fpecies of the acipenfer or fturgeon, and diftinguifhes it by the name of the acipenfer without tubercles.

MARION, in *Geography*, a diftrict of South Carolina, containing 6914 inhabitants, of whom 2155 are flaves.

Marion's and *Crozet's Iflands*, four iflands of the Indian ocean, difcovered by captains Marion and Crozet, French navigators, in the year 1772, and named by captain Cook in 1776. S. lat. 48°. E. long. 47°.

MARIOS, in *Ancient Geography*, a town of Laconia, N. of Geronthræ, pleafantly fituated near a wood, and amidft fountains; and having in its vicinity a temple called Pantheon, from its being dedicated to all the gods. In the town was alfo a temple of Diana, in which were fountains.

MARIOTTE, Edme, in *Biography*, an eminent French philofopher who flourifhed about the middle of the 17th century, was a native of the province of Burgundy. He was brought up to the church, and obtained the priory of St. Martin fous Beaume, at fome diftance from Dijon. He was admitted a member of the French Academy of Sciences in 1666, and died in 1684. He was an excellent mathematician, and one of the earlieft French philofophers who applied to experimental refearches. His principal works are "A Treatife on the Shock or Collifion of Bodies;" "An Effay on Phyfics;" "A Treatife on the Preffure and Motion of Fluids;" "New Difcoveries relating to Vifion;" "A Treatife on Levelling;" "A Treatife on the Motion of Pendulums," and "Experiments on Colours." He alfo communicated many curious and valuable papers to the academy, which were inferted in their Memoirs, from vol. i. to x. A collection of all his pieces was publifhed at Leyden in 1717, in 2 vols. 4to.

MARIOUA, in *Geography*, a town of Brafil, on the Rio Negro; 125 miles W. of Fort Rio Negro.

MARJORAM, in *Botany* and *Gardening*. See Origanum.

Marjoram, in the *Materia Medica*. The *fweet* marjoram has been thought to be the Σαμψυχον or Amaracus of the ancients. It has been long cultivated in our gardens, and is in frequent ufe for culinary purpofes. The leaves and tops have a pleafant fmell, and a moderately warm, aromatic bitterifh tafte. They yield their virtues both to aqueous and fpirituous liquors by infufion, and to water in diftillation; affording a confiderable quantity of effential oil, amounting, according to Beaumé, to 15 ounces from 150 pounds of the recent plant. On being long kept this oil affumes a folid form. When carefully drawn it is of a pale yellow colour, and of a hot penetrating tafte. This plant has been chiefly recommended in diforders of the head and nerves, in uterine obftructions and mucous difcharges, proceeding from a laxity and debility of the folids, and a fluggifh ftate of the juices, and in the humoural afthmas and catarrhs of old people. The powder of the leaves, their diftilled water, and the effential oil properly diluted, are agreeable errhines, and accounted particularly ufeful in pituitous obftructions of the noftrils, and diforders of the olfactory organs. Its medicinal qualities agree with thofe of the wild marjoram; but being much more fragrant, it is deemed to be more cephalic, and better adapted to the complaints denominated nervous; it may, therefore, be employed with the fame intentions as lavender. It is directed in the compofition of the pulvis fternutatorius in the Pharmacopeias, with a view to the agreeable odour which it diffufes to the afarabacca, rather than to its errhine power, which is very confiderable. In its recent ftate, it is faid to have been fuccefsfully applied to fcirrhous tumours of the breaft. Lewis and Woodville.

The leaves and flowery tops of the common *wild* marjoram, which grows on dry chalky hills and gravelly grounds in feveral parts of England, and flowers in July and Auguft, have an agreeable aromatic fmell, and a pungent tafte, approaching to that of the garden marjoram, and much refembling thyme; with which they appear to agree in medicinal virtue, being deemed emmenagogue, tonic, ftomachic, &c.; effects which can only be afcribed to the aromatic and ftimulant powers which all the herbs of this natural order feem to poffefs in common. Infufions of them are fometimes drank as tea, in weaknefs of the ftomach, diforders of the breaft, for promoting perfpiration of the fluid fecretions in general; they are fometimes ufed alfo in nervine and anti-rheumatic baths; and the powder of the dried herbs as an errhine. Diftilled with water, they yield a moderate quantity of a very acrid, penetrating, effential oil, fmelling ftrongly of the marjoram, but lefs agreeable than the herb itfelf; this oil is applied, on a little cotton, for eafing the pains of carious teeth; and fometimes diluted and rubbed on the noftrils, or fnuffed up the nofe, for attenuating and evacuating mucous humours. The country people ufe the tops of the plants to dye purple. Lewis and Woodville.

The dittany of Crete, which is a fpecies of origanum, is a very warm aromatic, of an agreeable fmell, and hot biting tafte: the leaves, which impart their virtues both to water and rectified fpirit, tinging the former of a yellowifh, and the latter of a greenifh colour, have been chiefly recommended as emmenagogue, alexipharmic, and vulnerary. When diftilled with water, if the quantity of dittany be large, there feparates, fays Neumann, a fmall portion of a yellowifh effential oil, of a highly pungent aromatic tafte and fmell, and which congeals in the cold into the appearance of camphor. This fort was much valued among the ancients, and applauded by their poets.

Thus Virgil defcribes it:

> "Hic Venus, indigno nati concuffa dolore,
> Dictamnum genitrix Cretæâ carpit ab Idâ,
> Puberibus caulem foliis, et flore comantem
> Purpureo: non illa feris incognita capris
> Gramina, cùm tergo volucres hæfere fagittæ"
> Æn. l. xii. 411.

It was efteemed a fpecific for wounds of arrows, which it drew out with wonderful eafe, and according to them only grew in the ifland of Crete, and only in a little obfcure corner of it, whence it obtained its name *dictamnus Creticus*. It ftill grows in that ifland. M. Tournefort, who was in Crete, defcribes the place where it grows, and fays it flourifhes there almoft all the year.

This is a perennial plant, and though a native of ftony grounds in Greece, and the ifland of Candy, bears the ordinary winters of our own climate. The fhops are generally fupplied from Italy with the leaves tied up in bundles, which are often damaged or decayed, and at beft not fuperior to thofe of our own growth. Although rarely ufed at this day, this plant certainly poffeffes, in a very confiderable degree, the ftimulant and aromatic qualities which characterife this clafs of plants. Lewis and Woodville.

MARIOUT, in *Geography*, a town of Egypt, on the W. coaft of Birk Mariout; 15 miles S.S.W. of Alexandria.

MARIPA, in *Botany*, a barbarous Caribean name, adopted by Juffieu from Aublet, but, according to his own principles, retained only till the genus is either better eftablifhed, or entirely fet afide. Aubl. Guian. 230. Juff. 133. Lamarck Illuftr t. 110.—Clafs and order, *Pentandria Monogynia*. Nat. Ord. *Convolvuli*, Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five deep, roundifh, concave fegments, folding over each other. *Cor.* of one petal, tubular; tube twice as long as the calyx, dilated at the bafe, as well as at the mouth; limb in five equal, roundifh, crenate, fpreading lobes. *Stam.* Filaments five, fhort, thread-fhaped, inferted into the lower part of the tube, oppofite to the fegments of the limb; anthers vertical, oblong, cloven at the bafe, of two cells, fhorter than the limb. *Pift.* Germen fuperior, ovate; ftyle thread-fhaped, declining, longer than the corolla; ftigma peltate, convex. *Peric.* Capfule? of two cells. *Seeds* two in each cell, erect, parallel, convex externally, angular on the infide.

Eff. Ch. Corolla tubular, its limb in five equal fpreading fegments. Anthers long, arrow-fhaped. Stigma peltate, convex. Capfule? of two cells. Seeds in pairs, erect, parallel.

1. M. *fcandens*. Aubl. Guian. t. 91.—Found by Aublet in Guiana, on the banks of the river Sinémari, eight leagues from its mouth, flowering in November. The *ftem* is twining, fomewhat woody, fupporting itfelf, by means of tendrils, upon the neighbouring trees. *Leaves* alternate, ftalked, ovate, entire, pointed, fmooth, firm and fhining, fix inches long at moft. *Panicles* terminal, branched and forked, with a pair of fmall ovate *bracteas* at each fubdivifion. *Flowers* white, about the fize of the common White Jafmine.

MARIPIPI, in *Geography*, one of the fmaller Philippine iflands; 20 miles S.E. of Mafbate.

MARIPONDY, a town of Hindooftan, in the Carnatic; 15 miles S.W. of Ongole.

MARIQUITA, a town of South America, in the viceroyalty of New Granada, and province of Santa Fé, formerly celebrated for the rich mines of gold in its vicinity; on the W. are thofe of the Bocaneme, and San Juan de Cordova, bordering on thefe of Hervi, Malpafo, Guarino, and Puano; and on the E. the filver mines of St. Anna, Lojas, and Frias; the filver, however, being mingled with the pureft gold, but of difficult feparation. This city, which was formerly opulent, is reduced to 300 inhabitants, a decline owing to the failure of the mines, fo that thofe who have been engaged in them are unaccuftomed to other branches of induftry. Quefada, the conqueror of New Granada, died at Mariquita in 1597, but his body has been removed to the cathedral of Santa Fé. This city is diftant 80 miles S. of Santa Fé de Bogota. N. lat. 5° 16′. W. long. 74° 6′.

MARIS, in *Ichthyology*, a name given by Charleton and fome others to a fifh called by the generality of both the ancient and modern writers, *fmaris*, and by fome *lucomenides*, from its whitifh colour, and its external refemblance to the fifh called *mænis* and *mæna*; it is, like that fifh, a fpecies of the fparus; and is diftinguifhed by having a black fpot on each fide, and the tail and belly-fins red. See SPARUS *Smaris*.

MARISCA, in *Surgery*, an excrefcence near the anus, fo named from its refemblance to a fig.

MARISCH, in *Geography*, a town of Moravia, in the circle of Prerau; 12 miles N. of Freyberg.

MARISCUS, in *Botany*, a Latin word ufed by Pliny for fome kind of bulrufh, and fuppofed to be derived from *mare*, the fea, near which the plant naturally grows. Haller adopted this name for the *Schoenus* of Linnæus, becaufe he thought the latter too near *Schinus*, and becaufe it was merely the Greek fynonym of *Juncus*. This laft reafon is futile, and fet afide by innumerable examples. Gærtner however follows Haller; but they have not been imitated. As the *Schoenus Marifcus* of Linnæus is probably a good diftinct genus, having only two ftamens, and a drupa containing one feed, fee Engl. Bot. t. 950, it is much to be wifhed that the name in queftion had been referved for that genus. It is, neverthelefs, now otherwife appropriated, by Vahl and Brown, whofe peculiarly great authority in this tribe induces us, without hefitation, to concur with them. Vahl Enum. v. 2. 372. Brown Prod. Nov. Holl. v. 1. 218. —Clafs and order, *Triandria Monogynia*. Nat. Ord. *Calamariæ*, Linn. *Cyperoideæ*, Juff.

Gen. Ch. *Cal.* a glume of two unequal membranous valves, containing two or three florets. *Cor.* a fingle glume, ribbed, that of the lower floret embracing the bafe of the upper. *Stam.* Filaments three; anthers linear. *Pift.* Germen fuperior, angular; ftyle three-cleft, deciduous; ftigmas fimple. *Seed* fingle, naked, triangular, without any briftles at its bafe.

Eff. Ch. Calyx of two valves, two or three-flowered. Glumes

Glumes of the corolla imbricated, ribbed. Style three-cleft, deciduous. Seed triangular, without briftles at its bafe.

Obf. Mr. Brown remarks that this genus differs from *Cyperus*, with which it agrees in habit, only in the fewnefs of its florets. Profeffor Vahl defcribes its habit thus.

"*Root* throwing out fcyons. *Stems* erect, acutely triangular, fomewhat bulbous at the bafe, leafy in their lower part. *Leaves* linear, differing in breadth in different fpecies, keeled, fheathing and purple at the bafe, rough with minute ferratures at the edges and keel. *Involucral leaves* like the others. *Spikes* in a terminal umbel, one upon each ftalk, with a feffile fpike in the centre. *Spikelets* alternate, rather diftant, cylindrical, imbricated. *Bractea* folitary at the bafe of each fpike, gradually tapering upwards. Glumes of the *corolla* ftriated. *Receptacle* of the fpikelets angular, toothed."—The fame author adds, that he has "feparated the plants compofing this genus from Kyllingia, (fee that article and Cyperus,) becaufe their habit, as well as fructification, is different. The fpikelets are round and awl-fhaped, not ovate and compreffed. The calyx does not contain a folitary floret, but at leaft two, for the moft part three. The glumes of the corolla are difpofed in a different manner, not being parallel, but one above the other, fo that the lowermoft includes the lower half, or thereabouts, of that above it, each glume being furnifhed with a piftil, as may readily be perceived, even in dried fpecimens. While the lower glume is in full flower, the upper is convoluted, they having nothing in common but their receptacle. There are therefore as many florets as glumes. The ftyle is always in three, not two, divifions. If there be three florets, the fecond is always raifed on a partial ftalk. A feed is found at the bottom of each glume. Thefe plants feem more akin to *Cyperus*, and might, perhaps without great impropriety, be referred to that genus, as their glumes are two-ranked, and the fmall number of florets conftitutes the only difference. That the two lowermoft fcales of the fpikelet are barren, and therefore confidered as a calyx, is no objection, the fame being the cafe with many fpecies of *Cyperus*. If however the prefent genus be allowed to remain, either on account of the fewnefs of its florets, or becaufe *Cyperus* is already fufficiently extenfive, the characters above given will diftinguifh it."

Vahl defines eleven fpecies of *Marifcus*, to which four more are added in Mr. Brown's *Prodromus*.

1. M. *capillaris*. Vahl n. 1. (Schoenus capillaris; Swartz Ind. Occ. 106. Cyperus nanus; Willd. Sp. Pl. v. 1. 272, excluding Plukenet's fynonym.)—Spike oblong, crowded. Spikelets deflexed. Involucrum of two leaves. Stem and foliage almoft capillary.—Native of the Weft Indies. From fix to twelve inches high, very flender, refembling a fmall capitate *Carex*. The *fpikelets* are three-flowered, oblong, tawny, ftrongly deflexed, crowded into a round head the fize of a large pea.—Willdenow has this plant alfo at p. 268. See Vahl.

2. M. *gracilis*. Vahl n. 2.—Leaf folitary. Spike feffile, nearly globofe. Involucrum of two fetaceous leaves.—Found by Richard in South America. *Stems* a foot high or more, very flender, clothed at the bafe with two fheaths, one of which only bears a narrow *leaf*, two or three inches long. *Involucrum* of three leaves, two of which are two or three inches in length, the third but half an inch. *Spike* fcarcely larger than a coriander feed, yellow. *Spikelets* ovate, acute, triangular when in feed. *Stamens* but two. *Richard*.

3. M. *aphyllus*. Vahl n. 3. (Juncus cyperoides, culmo compreffo ftriato, radice odorata tuberofa, capitulo rotundo compacto; Sloane Jam. v. 1. 121. t. 81. f. 2.)—Leaflefs. Spike globofe, feffile. Involucrum of a few broad leaves, fhorter than the fpike.—Native of fandy ground in the bay of Honduras. *Sloane*. *Root* knotty, creeping, red, fragrant like the fweet *Cyperus*, much efteemed by the Indians for curing the cholic. *Stems* a foot high, or more, rather ftout, triangular, and compreffed, clothed at the bafe with feveral clofe fheaths, but deftitute of leaves. *Involucrum* of three, four, or five fpreading ovate leaves, fhorter than the head or *fpike*, which is twice as big as a pea, compofed of very numerous little *fpikelets*, whofe glumes are dotted with purple. *Stamens* three.—Vahl had a fpecimen from Senegal, which he judged the fame fpecies, though twice as large as the American plant.

4. M. *paniceus*. Vahl n. 4. (Kyllingia panicea; Linn. Suppl. 105. Rottb. Gram. 15. t. 4. f. 1. Gærtn. v. 1. 12. t. 2. f. 8. Marifcus biglumis.)—Spikes cylindrical. Spikelets oblong, imbricated, accompanied by fmall fetaceous bracteas.—Native of Arabia Felix and of Tranquebar. A foot high, with numerous *leaves*, as tall as the ftem, and a quarter of an inch broad. *Involucrum* of two long leaves, and two or three much fmaller. *Spikes* five or fix, half an inch long, on fpreading ftalks of various lengths. *Spikelets* numerous, fpreading, fomewhat imbricated, their glumes with a green keel and white edges. *Seed* three-ribbed, dotted with purple.

5. M. *flavus*. Vahl. n. 5—Spikes cylindrical. Spikelets oblong, accompanied by fetaceous finely ferrated bracteas, of their own length.—Gathered in South America by Von Rohr and Richard. Akin to the laft, but differing in its *bracteas*, as well as in its broader more ftriated *glumes*. *Vahl*.

6. M. *ovularis*. Vahl n. 6. (Kyllingia ovularis; Michaux Boreali-Amer. v. 1. 29. Schoenus umbellatus; Jacq. Ic. Rar. t. 10. Scirpus echinatus; Linn. Sp. Pl. 74. Herb. Linn.)—Spikes roundifh-ovate. Spikelets fpreading every way. Involucrum of many leaves.—Native of North America; whether of the Eaft Indies alfo we cannot determine. It is akin to the two laft, but diftinguifhed by the very numerous *involucral leaves*, and globofe *fpikes*, compofed of *fpikelets* that fpread in all directions, refembling the head of a *Sparganium*, as Plukenet, who figures it in his t. 91. f. 4, well obferves. Vahl has rightly brought together the above fynonyms, as belonging to one fpecies.

7. M. *retrofractus*. Vahl n. 7. Gærtn. t. 2. f. 5 (Scirpus retrofractus; Linn. Sp. Pl. 74 Cyperi genus indianum, &c.; Pluk. Phyt. t. 415. f 4.)—Spikes loofely imbricated downward. Spikelets awl-fhaped, reflexed. Involucrum of few leaves.—Native of Virginia. The whole *plant* has a glaucous hue. Its habit is not unlike the laft, but the flender taper-pointed *fpikelets* are all remarkably drooping, or bent downward, and but loofely imbricated.

8. M. *umbellatus*. Vahl n. 8. (Kyllingia umbellata; Linn. Suppl. 105. Rottb. Gram. 15. t. 4. f. 1. Scirpus cyperoides; Linn. Mant. 181. Koll pullu; Rheede Malab. v. 12. 119. t. 63.)—Spikes cylindrical, clofely imbricated downward. Spikelets awl-fhaped, reflexed. Involucrum of many leaves.—Native of the Eaft Indies. The *fpikelets* are not one-third the fize of the laft, much more numerous and crowded, but not fo taper-pointed.

9. M. *alternifolius*. Vahl n. 9.—Spikes cylindrical, imbricated downward. Involucral leaves, as well as the flower-ftalks, alternate.—Native of Guinea. *Stems* a foot high or more, as thick as a pidgeon's quill, taller than the foliage. *Involucrum* of ten alternate crowded leaves, fome of them as long as the ftem, each accompanied by an axillary *flower-ftalk*, full two inches long, invefted with a pur-

ple-

ple-dotted fheath, hardly an inch in length. *Spikes* half an inch long, green. *Vahl.*

10. M. *cyperinus.* Vahl n. 10. (Kyllingia cyperina; Retz. Obf. fafc. 6. 21)—Spikes cylindrical. Spikelets erect, accompanied by bracteas fhorter than themfelves.—Native of the Eaft Indies and Guinea. *Stems* about a foot high. *Leaves* few, moftly taller than the ftem. *Involucrum* of fix or feven very long leaves. *Spikes* fix or feven, feffile or ftalked, an inch long, imbricated upwards. *Spikelets* awl-fhaped, accompanied by briftle-fhaped rough *bracteas,* about half their own length, or rather more. Glumes of the *calyx* longer than ufual; thofe of the *corolla* twice as long as the calyx, deeply furrowed, with a green keel, and pale tawny edge.

11. M. *elatus.* Vahl n. 11. (Kyllingia incompleta; Willd. Sp. Pl. v. 1. 258. Jacq. Ic. Rar. t. 300.)—See Kyllingia, from whence this fpecies fhould be removed hither, with the following character.—Spikes cylindrical. Spikelets erect, with bracteas about their own length.

To thefe we fubjoin Mr. Brown's four fpecies, which not having feen, we could not otherwife arrange, for want of knowing their affinities.

12. M. *lævis.* Brown n. 1.—Spikelets awl-fhaped, round, curved, of two or three florets. Umbel fimple. Involucrum of three leaves. Stem fmooth.—Native of the country near Port Jackfon, New South Wales.

13. M. *fcaber.* Br. n. 2.—Spikelets awl-fhaped, round, curved, two-flowered. Umbel compound. Involucrum of many leaves. Stem rough.—Native of the tropical part of New Holland.

14. M. *decompofitus.* Br. n. 3.—Spikelets ftraight, ovato-lanceolate, roundifh, two-flowered. Umbel once or twice compound. Spikes fomewhat capitate. Involucrum and leaves rough.—From the fame country.

15. M. *conicus.* Br. n. 4.—Spikelets fingle-flowered. Umbel fimple. Spikes conical, fomewhat three-lobed. Involucrum and leaves rough.—From the fame country.

MARISFELD, in *Geography*, a town of Germany, in the county of Henneberg; fix miles E. of Meinungen.

MARITACACA, in *Zoology*, the name of a very remarkable American animal, more ufually known by the name of the opoffum.

MARITAGIUM, in *Law*, contradiftinguifhed from *Matrimonium*, or right of marriage, denoted, in its feodal fenfe, the power which the lord, or guardian in chivalry had of difpofing of his infant ward in matrimony. While the infant was in ward, the guardian had the power of tendering him or her a fuitable match, without difparagement or inequality; which, if the infant refufed, they forfeited the value of the marriage, "valorem maritagii" to their guardian; that is, fo much as a jury would affefs, or any one would *bonâ fide* give to the guardian for fuch an alliance; and if the infants married themfelves without the guardian's confent, they forfeited double the value, "duplicem valorem maritagii." This, fays judge Blackftone, feems to have been one of the greateft hardfhips of our ancient tenures.

MARITICO, in *Geography*, a river of South America, in the province of Carthagena, which runs into the Spanifh Mai, N. lat. 8° 5'. W. long. 76° 42'.

MARITIME, of *mare*, *fea*, denotes any thing belonging to the fea.

Maritime *Caufes* and *Court.* See Court *of Admiralty*.

Maritime *Eftate*, is ufed in contradiction to the civil and military eftate, to exprefs that part of his majefty's lay fubjects, that are occupied in naval or fea fervice. See Marines and Navy.

MARITUS, in the chemical jargon, a word ufed to exprefs the fulphur of metals. The writers on the fubject of the philofopher's ftone ufually exprefs themfelves in this enigmatical manner, calling fulphur the hufband, and mercury the wife in all metals; which, as they are more or lefs perfectly combined, make the metal more or lefs pure, and approaching to perfection.

MARIVAUX, Peter Carlet de Chamblain de, in *Biography*, a diftinguifhed dramatical writer, was born at Paris in 1688. He enjoyed the advantages of a flight claffical education only, but was regarded as a youth of parts, and the ambition of becoming an original writer was his ruling paffion. One of his firft attempts was a traveftie of Homer, on the model of Scarron's Virgil, for the direct purpofe of throwing ridicule on the father of ancient poetry. At the age of eighteen he produced, within a few days, in confequence of a wager, a comedy entitled "Le Père Prudent." This was not acted in public; and it was not till he had attained to his thirty-fecond year that he ventured to prefent upon the theatre his tragedy of "The Death of Hannibal:" the reception of this piece was far from favourable, and he thenceforth confined himfelf to comedy, in which he ftruck out a new path. This was that of a delicate and refined fentiment in the developement of paffion and character, which, in general, fucceeded very well with a people who pride themfelves on a nice perception of all the fhades and diverfities in the human mind. He brought out the greateft number of his pieces on the Italian theatre, which is accounted lefs critical than the French theatre. He produced about thirty pieces, many of which are ftill occafionally reprefented on the ftage, and are popular. Marivaux has obtained a greater reputation by his novels than by his dramas. The firft novel which he compofed was entitled "Pharfamon, ou les nouvelles folies romanefque," a kind of imitation of Don Quixote: this is lefs efteemed, and, indeed, lefs known than his two others, "Marianne," and "Le Payfan Parvenu." The "Marianne" is reckoned the principal, and it is thought, by competent judges, that few works of the clafs rank higher. It difplays an intimate acquaintance with the humam heart, and prefents many truly interefting fituations, and many juft and elevated fentiments. The "Payfan Parvenu" is preferred by fome as poffeffing more gaiety and variety, and a more direct moral purpofe. Another work of this author deferving of notice is his "Spectateur François," which abounds in acute remarks and lively portraitures, and in wit and variety is reckoned to furpafs all his other pieces. He publifhed only two volumes for want of proper encouragement. When he had attained to his fifty-fifth year he obtained admiffion in the French academy. He died at the age of feventy-five, in the year 1763. He was mild, friendly, and philanthropical: full of fympathy towards the indigent and afflicted, towards whom he exercifed a liberality often beyond the bounds of prudence. He was upright and difinterefted, carelefs of fortune, and contented to live in obfcurity: he was fincerely attached to religion, as the great refource of the wretched, but without any affectation of extraordinary devotion.

MARIVELAS, in *Geography*, one of the fmaller Philippine iflands, with a village, the houfes of which were conftructed of bamboo, and afcended by a ladder. One of thefe houfes, including the roof and frame, hardly weighed, according to Peroufe, 200 lbs: but the habitation of the officiating clergyman was of ftone. In the year 1780, the Moors from the iflands S. of the Philippines, invaded this ifland,

ifland, burnt the village, deftroyed the fort, the church, and the rector's houfe, and made flaves of all the Indians they could feize.

MARIVELAS *Bay*, a bay on the W. coaft of the ifland of Luçon, fheltered from all winds except thofe from S. to S.E.; with a clean bottom of ftiff mud or clay, and fufficient depth of water for veffels of any fize. It takes its name from that of the above-mentioned ifland. N. lat. 14° 30'. E. long. 120° 24'.

MARIUM, in *Ancient Geography*, a town of the ifle of Cyprus, upon the fouthern coaft, very near the fea, between Amathus to the W. and Citium to the N.E.

MARIUPOL, in *Geography*. See MARIANOPOLI.

MARITZ, or MARISEA, in *Ancient Geography*, a river of European Turkey, which rifes in a chain of mountains, called Balken (the ancient Hæmus,) and paffing by Philopopoli in a direction towards the E. and S. falls into the Ægean fea in the gulf of Enos, after a courfe of 200 miles. This river was the ancient *Hebrus;* which fee.

MARIUS CAIUS, in *Biography*, a famous Roman commander and head of a party, was born of an obfcure family in the diftrict of Arpinum. In early youth he was diftinguifhed by fize and ftrength of body, and roughnefs of manners. Having entered into the army at the military age, he foon gave proofs of great valour, and by his conduct on various occafions, attracted the notice of his general, Scipio, who foretold his future greatnefs. In the confulfhip of Metellus and Cotta, in the year 119 B.C. he became a candidate for civil honours, and obtained the office of tribune of the people. In performing the duties of this office he obtained great reputation, and was regarded by the people as their moft determined protector againft patrician tyranny. He had many antagonifts, and was unfuccefsful in his application for the edilefhip; but in the year B.C. 116, he acquired the office of prætor. In the following year he was appointed to the government of the Farther Spain. In this ftation he conducted himfelf with great equity, and, by his vigour, cleared the province of the banditti who infefted it. At the expiration of his office he returned to Rome, where his want of birth, of fortune, and eloquence, checked his farther advancement, and, for fome years, he remained idle and undiftinguifhed. At length, in the year 109 B.C., when the conful Metellus was fent into Africa to conduct the war againft Jugurtha, he offered Marius the poft of one of his lieutenants, which the latter gladly accepted. The field of ambition was now open before him, and he refolved to cultivate it by all the means in his power. He ingratiated himfelf with the foldiery by partaking of all their hardfhips and dangers, and he felt neither the principles of duty or gratitude operate upon him fo as to reftrain him from injuring his patron Metellus in the public eftimation. His fuccefs in repulfing Jugurtha, who had made an unexpected attack upon him, gave him luftre in the eyes of the army, and he did not fail to make invidious comparifons between his commander and himfelf. What he faid was communicated by the foldiers to their friends at Rome; this prepared the way for thofe exertions in his favour upon which he relied for the attainment of his objects. Being determined to ftand candidate for the confulfhip, he publicly afked leave of abfence of Metellus for that purpofe, who haughtily faid to him, "It will be time enough for you to think of that honour when my fon fhall be old enough to be your colleague." After fome time he was allowed to leave the army for Rome, and by his great activity and vaft exertions obtained the confulate by a great majority. This was in the year 107, and the next object of his ambition was to fupplant Metellus in the command, for which purpofe he did not fcruple to make ufe of the bafeft means that a fervile mind could invent. He obtained his object, and on his arrival in Africa with the fupreme command, Metellus declined an interview, and leaving his army to be delivered up by a lieutenant, embarked for Italy. Marius fpent the fummer in difciplining his new levies, and in watching the motions of the two kings, Jugurtha and Bocchus. At length his gloomy heart fuggefted to him that the city of Capfa might afford him a fit object of enterprize: he fuddenly marched and furrounded it, and having forced it to furrender, he cruelly put to death all the adult males, felling the other inhabitants for flaves, and then levelling the place with the ground. This unfortunate city was fituated in the African defert, and its almoft inftant deftruction ftruck fuch terror into every place to which the knowledge of the fact could extend, that deputies came in from all fides making fubmiffion and offering him thofe fupplies for his army which the country afforded. He next invefted Mulucha, a fortrefs fituated upon a high and infulated rock that had been deemed impregnable: after much time being fpent, and various attempts to ftorm it had failed, he had given orders to abandon the enterprize, when a Ligurian foldier accidentally difcovered an acceffible part in a cleft of the rocks: by this they made themfelves mafters of the place, and found in it an immenfe quantity of treafure, fo that the army were enabled to march back to the fea-coaft laden with booty. On their return they were furprized by the united forces of the two kings, and brought into imminent danger, from which they were extricated by the fkill and exertions of Marius, and his quæftor Sylla, who now began to diftinguifh himfelf. The Numidians, in repeated attacks, were repulfed with great flaughter, and the Roman army gained their winter-quarters in fafety. In the following year overtures of peace were made by Bocchus, who agreed, as part of the conditions, to betray Jugurtha into the hands of the Romans, which was effected by the management of Sylla. By this event the war was brought to a conclufion, with no lefs honour to Sylla than to Marius. Owing to fome fudden and unexpected danger which threatened the city Marius returned, was a fecond time elected conful, and obtained a triumph in confequence of his fucceffes, at which Jugurtha and his two fons were led chained before his chariot. The war againft the Gauls and Cimbri was entrufted to him, and he continued in his career of fuccefs: he was a ftrict difciplinarian, kept his foldiers in the moft perfect obedience, and did himfelf honour by the equity with which he adminiftered juftice among them. An inftance of this kind is mentioned, in which he not only pardoned, but rewarded a youthful foldier who had killed his nephew for an infamous attempt on his perfon. Thus preferving his reputation entire, and alfo on account of the fervices which he yielded his country, he was elected a third and a fourth time conful. When it was propofed to confer that high honour upon him a fifth time, he accepted it only as an obligation to free the republic from its remaining foe, and declined a triumph till his victory fhould be complete. In the mean time the Cimbri had poured into Italy fuch immenfe numbers of troops, that an univerfal panic and conflernation were experienced, till Marius with his army made a junction with them, and he himfelf took the fupreme command. A moft bloody battle fucceeded, and the Romans, by the fuperior fkill of their generals, rendered the field of battle a fcene of mere carnage. Almoft the whole nation of the Cimbri, with their wives and children, fell in the action, or were made prifoners, while the lofs of the Romans was ſo ſmall, as ſcarcely to be credited. The Roman ſoldiers were diſpoſed to give their plebeian hero all the honour of the day, yet it was not poſſible to deprive Catullus of his ſhare of the victory. Each chief built a temple which he had vowed during the action; that of Marius was conſecrated to Virtue and Honour, and on the day of its dedication he gave games to the people after the Grecian manner; but being himſelf ignorant in ſuch ſports, he wiſely withdrew as ſoon as they were commenced. He was now too much habituated to power to acquieſce in the condition of a private citizen, and declared himſelf a candidate for a ſixth conſulate: being, though not without the groſſeſt corruption, elected to the office on which he had ſet his heart, he ſought that employment for his talents at home which the reduction of foreign enemies left him no opportunity of exerciſing abroad. He determined to oppoſe himſelf to the riſing power of Sylla, which was the foundation of the civil war. Sylla refuſed to deliver up the command of the forces with which he was empowered to proſecute the Mithridatic war, and he reſolved to oppoſe the authors of the demand, which he conſidered as arbitrary and improper. He advanced to Rome, and Marius was obliged to ſave his life by flight. Unfavourable winds prevented him from ſeeking a ſafer retreat in Africa, and he was left on the coaſts of Campania, where he was ſoon diſcovered, hidden in a marſh, by the emiſſaries of the enemy. He was violently dragged from his vile retreat, and hurried to the neighbouring town, and before magiſtrates entirely devoted to the intereſts of Sylla, who, without the ſmalleſt heſitation, paſſed ſentence of death on their priſoner. A ſoldier was ſent to put him to death: the man entered the apartment with a drawn ſword, when he ſaw a light beam from the ſtern countenance of the illuſtrious captive, and heard a voice exclaiming "Tune, homo, audes occidere Caium Marium? Dareſt thou, man, to kill Caius Marius?" Overcome with terror, he ruſhed out, dropped his ſword and declared himſelf incapable of ſo baſe an action. An adventure ſo uncommon awakened the compaſſion of the people, who conſidered it as a divine interference in behalf of Marius, and they accordingly not only releaſed Marius from priſon, but favoured his eſcape into Africa. Here he joined his ſon Marius, who had been exciting and arming the princes of the country in his cauſe. Marius landed near the walls of Carthage, and received ſome conſolation at the ſight of the venerable ruins of a once powerful city, which, like himſelf, had been expoſed to calamity, and felt the cruel viciſſitude of fortune. This place of his retreat was ſoon known, and the Roman governor, willing to conciliate the favour of the proſperous Sylla, ſent an officer to warn him to leave the province. The noble minded exile replied to the man, "Go tell thy maſter, that thou haſt ſeen the baniſhed Marius ſitting on the ruins of Carthage." He ſoon found it neceſſary to ſeek a place of ſafety in a neighbouring iſland, where he heard that Cinna had embraced his cauſe at Rome; animated with this intelligence, he ſet ſail to aſſiſt his friend and advocate, at the head of a thouſand men only. His army gradually increaſed after he had landed in Tuſcany, and he was enabled to march into Rome like a conqueror. Cinna, by his own authority, inveſted Marius with the title of proconſul, and would willingly have aſſigned him attendants belonging to that dignity; but Marius, affecting the humility of an exile worn down by age and grief, declined the honour, and appeared in ſqualid attire, unaccompanied, and walking ſlowly, with downcaſt looks, while a ſullen ferocity broke through and ſtruck the beholders with terror. After various actions the ſenate thought it neceſſary to treat with Cinna; he was reſtored to the conſular dignity and invited into the city. The chiefs began their march, but Marius halted at the gate, obſerving, that he was a baniſhed man, and prevented, by the laws, from entering till the ſentence againſt him was repealed. This was ſpeedily done, but ſcarcely was the decree reverſed, before he began to take a moſt ſignal revenge on his enemies. Rome was filled with blood, and he who had once been called the father of his country, marched through the ſtreets of the city, attended by a number of aſſaſſins, who ſlaughtered all thoſe whoſe ſalutations were not anſwered by their leader. Such was the ſignal for murder. When Marius and Cinna had ſufficiently gratified their reſentment, they made themſelves conſuls; but Marius was already worn out with old age and infirmities, and lived but ſixteen days in poſſeſſion of the conſular dignity with which he had been inveſted for the ſeventh time. He died in the year 86 B.C., and was thus ſaved from the diſgrace and ſufferings which awaited his party from the hand of the victorious Sylla. Marius had rendered himſelf conſpicuous by his conqueſts, and infamous by his cruelties. He was unqueſtionably one of the greateſt, and moſt fortunate of the Roman generals, and had, in his character, ſome features of rude grandeur. Rome ſeemed to rejoice at the fall of a man whoſe ambition had proved fatal to ſo many citizens. His chief qualifications were thoſe of a great general, and with theſe he rendered himſelf the moſt illuſtrious and powerful of the Romans, becauſe he was the only one whoſe ferocity ſeemed capable of oppoſing the barbarians that would have laid waſte the empire. His ſon Caius Marius was as cruel as himſelf, and ſhared his good and his adverſe fortune: at the death of his father and Cinna, he became the leader of the party: he made himſelf conſul when he was but twenty-five years of age, and he murdered all the ſenators who oppoſed his ambitious views. He was defeated by Sylla, and fled to Præneſte, where he killed himſelf. Plutarch. Univer. Hiſt.

MARIUS, LEONARD, a Dutch theologian, who flouriſhed in the 17th century, was born at Goes, in Zealand, but in what year is not known; nor have we any material facts relating to him till we find him created a doctor of divinity at Cologne. He was elected profeſſor of theology in that univerſity, and was afterwards choſen preſident of the Dutch college in that city. He was afterwards appointed vicar-general of the chapter of Haarlem, and paſtor at Amſterdam. He died in the year 1628, leaving behind him a conſiderable character for talents and learning. He was profoundly ſkilled in the Greek and Hebrew languages, and in the knowledge of the ſacred ſcriptures. He was author of "Commentarius in Pentateuchum," which is regarded as a work of great merit: "Hierarchiæ Eccleſiaſticæ Catholica aſſertio," intended as a refutation of the famous treatiſe of Mark Antony de Dominis "De Republica Eccleſiaſtica;" and of a variety of controverſial pieces in the Dutch language. Moreri.

MARK, POPE, and a ſaint in the Roman calendar, probably a native of Rome, and ſucceſſor to pope Sylveſter in the year 336. There is nothing recorded of him or of his pontifical acts that can claim the attention of our readers. Some authors ſay that he occupied the papal chair between two and three years, but others, and thoſe the moſt worthy of credit, ſtate that he died within nine months of his election. Moreri. Bower.

MARK, among *Bowlers*. See BOWLING.

MARK, in *Matters of Commerce and Manufacture*, a certain character ſtruck, or impreſſed, on various kinds of commodities, either to ſhew the place where they were made, and the perſons who made them; or to witneſs they have been viewed

viewed and examined by the officers or magiftrates charged with the infpection of that manufacture; or, laftly, to fhew that the duties impofed thereon have been regularly acquitted.

Thus are cloths, leathers, cutlery-ware, paper, plate, weights, meafures, &c. to be *marked*.

The mark on goods alfo is what afcertains the property or goodnefs thereof, &c. And if one man fhall ufe the mark of another, to the intent to do him damage, action upon the cafe lieth. A penalty is inflicted in this cafe, by the ftat. 23 Eliz. cap. 8.

Mark is alfo a particular fign or character, known only to the trader who pitches on it; whereby, being fixed to any commodity, he recollects the price it coft him.

Thefe marks, otherwife called *numeros*, are taken according to the fancy of thofe who ufe them; but, ordinarily, they are chofen from among the letters of the alphabet, each having a relation to fome particular number of figures. They are of fo much ufe in trade, that the reader will not take it amifs, if we infert a little table to ferve as a model for their conftruction:

A	B	C	D	E	F	G	H	I	K	L	M
0	1	2	3	4	5	6	7	8	9	10	20

One example will give the whole ufe of this table. Suppofe, *v. g.* I would put on a piece of ftuff, that it coft 37*s.* 6*d. per* ell. I put an M for 20*s.* an L for 10*s.* an H for 7*s.* and a G for 6*d.* fo that the feveral letters written after each other (obferving always to feparate fhillings from pounds, and from pence, by points) will make this mark M. LH. G. equal to 37*s.* 6*d.*

Note, the mark may be diverfified infinitely, by adding other figures to the letters, in lieu of thefe.

Ordinarily fome word of a proper number of letters, all different ones, is chofen, that no relation may be traced among the letters, which may be done in the table here given.

Mark, *Marc*, or *Marco*, alfo denotes a weight ufed in feveral ftates of Europe, and for feveral commodities, efpecially gold and filver in France; where it was introduced under Philip I about the year 1080.

The mark is divided into eight ounces, called the "poids de marc;" the ounce being fubdivided into eight gros, 20 efterlins, 24 deniers, 40 mailles, and 80 felins, or 576 grains. A French mark weighs 5094 Dutch afes, or 3778 Englifh grains. Thus 60 oz. poids de marc are nearly equal to 59 oz. troy: or more accurately, 4608 French grains = 3778 Englifh grains. Diamonds are weighed by the ounce of 144 carats, each carat weighing four grains, poids de marc, or 3.279 Englifh grains.

The poids de marc was likewife, till the revolution, the legal weight for merchandize at Paris, and in moft other parts of France; the livre or pound being divided into two marks, or 16 ounces; and the ounce into eight gros, 24 deniers, or 576 grains; a quintal = 100 lb.; and a charge, three quintals; 100 lbs. poids de marc = 108 lb. avoirdupois. The apothecaries' weight in Paris was the common poids de marc, and the pound contained 16 ounces; but the ounce was divided into three duelles, four feiliques, fix fextules, eight drachms, 24 fcruples, or 576 grains. In other parts of France, the pound of apothecaries' weight was 12 ounces, and was therefore three quarters of the Paris apothecaries' pound.

At Amfterdam, the finenefs of gold under the old fyftem is expreffed in carats and grains; the mark being divided into 24 carats, and the carat fub-divided into 32 parts. The finenefs of filver is expreffed in deniers and grains, the mark fine being 12 deniers, the denier 24 grains. According to the new fyftem, the finenefs of gold and filver is expreffed by fuppofing it to be divided into 1000 parts, called milliemes; thus $41\frac{2}{3}$ milliemes anfwer to a carat of gold, that is the 24th part; and $83\frac{1}{3}$ milliemes to a denier of filver, or the 12th part. (See Money.) Nineteen marks Dutch troy weight of fine gold anfwer to 164 ounces of ftandard gold in London; and 37 marks troy of fine gold in Amfterdam are equal to 2665 ducats of gold in Hamburgh. The finenefs of filver is expreffed in pennyweights and grains; the mark being divided into 12 pennyweights, and the pennyweight into 24 grains. A mark of fine filver, in bars, is worth 25 florins 16 ftivers current, more or lefs; a mark of Englifh filver coin is worth 25 fl. 12 ft. current, more or lefs; a mark of French filver, about 10 dwts. 21 gr. fine, is worth 23 fl. 8 ft., more or lefs. Wrought filver muft be $10\frac{1}{2}$ dwts. fine, and is ftamped with two croffes and a crown. Gold, filver, and coins, are weighed by the mark troy; a mark troy being divided into eight ounces, and the ounce into 20 engels, or 640 afes. This weight is the fame in all parts of Holland; 10,000 afes are equal to 7417 grains, Englifh troy weight; hence, two marks, or a pound, Dutch troy weight = 15 ounces, 16 pennyweights, 11 grains, Englifh troy weight, or 7595 grains; and 90 ounces, Dutch troy, weigh 89 ounces, Englifh troy; or 135 lbs. Dutch troy, 178 lbs. Englifh troy weight. In weighing pearls and diamonds, the mark troy is divided into 1200 carats, fo that one engel, or 32 afes, is then equal to $7\frac{1}{2}$ carats; thefe are fubdivided into halves, 4ths, 8ths, 16ths, 32ds, and 64th parts. The affaying weight contains 12 pennyweights, of 24 grains each, to the mark; and at the mint, one engel is divided into four vierlings, eight troykens, or 16 duefkens. In the commercial weight, 1 lb. contains 2 marks, 16 ounces, 32 loots, or 128 drams, and weighs 10,280 afes, Dutch troy weight, or 7625 Englifh grains.

At Cologne the pound is divided into 2 marks, 16 ounces, 32 loths, 128 quints, or 256 pfenings. This weight is the fame as that with which gold and filver are weighed in Hamburgh, particularly at the bank; and, by an edict of the emperor Charles V. of 1524, the Cologne mark was made the ftandard weight for coin all over the empire, and ftill continues the fame. The Cologne mark muft weigh 3608 Englifh grains, 4400 French grains, 4352 Cologne efchen (a divifion ufed in Hamburgh) or 4864 Dutch afes; and in the valuation of coins, it is divided into 65,536 parts, called richtpfenings, each Cologne pfening containing 256 fuch parts; 480 marks Cologne weight = 451 ounces Englifh troy; and 100 lbs. Cologne weight = 103 lbs. avoirdupois.

At Dantzic, the mark of fine gold is divided into 24 carats, and each carat into 12 grains; the mark of fine filver into 16 loths, each of 16 pfenings; wrought filver is from 12 loths 12 pfenings, to 13 loths fine; a mark, gold and filver weight, is divided into 8 ounces, 16 loths, 24 fchotts or carats, 64 quintlins, or 256 pfenings; and weighs 3974 Dutch afes, or $2947\frac{1}{4}$ Englifh grains. Hence 30 oz. of Dantzic gold and filver weight = 23 oz. Englifh troy nearly; or 45 marks of Dantzic = 23 lbs. troy.

At Geneva, the ounce of fine gold is reckoned at 24 carats, fubdivided by fome into 32, by others into 24 parts. The mark of fine filver is reckoned at 12 deniers; and the denier subdivided into 24 grains. The carat of fine gold is worth $48\frac{1}{3}$ sous current, or the ounce, 58 livres 4 sous, more or less; the denier of fine silver, $54\frac{1}{4}$ sous; or the mark, 32 livres 14 sous, more or less.

The mark with which gold and silver are weighed is generally considered the same as the French mark; some writers, however, state that 100 marks of Geneva are equal to 100 marks 1 oz. 13 deniers 22 grains, French poids de marc, the difference being $\frac{2}{9}$ *per cent.* In this case, 450 ounces of Geneva gold and silver weight answer to 451 ounces French, or $443\frac{1}{4}$ ounces English troy weight.

At Hamburgh, the fineness of gold is expressed in carats and grains; the mark fine (that is, the mark of fine gold) being reckoned at 24 carats, or 288 grains. Gold is sold by ducats; and $23\frac{1}{2}$ carats, or 282 grains of the Cologne mark of fine gold, are valued at 67 such ducats: hence 47 Cologne marks (or 353 ounces 5 dwt. 16 gr. English troy) weigh 3216 ducats, each valued at 96 shillings banco, more or less; 47 Cologne marks of Portugal gold, 22 carats fine, are reckoned at 2948 ducats; and 43 such marks of gold, $21\frac{1}{2}\frac{3}{4}$ carats fine, at 2692 ducats. Light ducats are sold by the mark; and for each full ducat weight, about $96\frac{1}{4}$ shillings banco are given. The fineness of silver is expressed in loths and grains; the mark fine being reckoned at 16 loths, or 288 grains. The Cologne mark of fine silver, in bars, is sold at about 27 marks 10 or 12 shillings banco; the mark of fine silver, in pieces of eight, that is, Spanish dollars, valued at $14\frac{5}{9}$ loths fine, is commonly a few shillings lower. But as the dollars coined since 1772 are at most only $14\frac{1}{2}$ loths (that is, 10 oz. $17\frac{1}{4}$ dwt.) fine, it occasions a difference in the price; because 88 marks of fine silver, in dollars valued at $14\frac{5}{9}$ loths fine, contain, in reality, only 87 marks of fine silver. In former times, for 2 marks of old but not worn-out dollars, 17 pieces were reckoned; and such a piece was sold for 48 shillings banco, more or less: whereas 1000 new rix-dollars now weigh 115 marks 4 to 8 loths; and 12 such marks are reckoned for 11 marks of fine silver.

Gold, silver, and coins, are weighed with the Cologne weight. The pound contains 2 marks, 16 ounces, or 32 loths; the ounce, 2 loths, 8 quentins, 32 pfenings, 544 eschen, or 8192 richt-pfenings. The Cologne mark weighs 3608 English grains; so that 480 ounces, Cologne weight, are equal to 451 ounces English troy weight. Pearls and diamonds are weighed by the carat of 4 grains; the carat being divided into 8, 16, 32, and 64 parts: 71 such carats weigh half an ounce, Cologne weight; hence a carat = 3.176 English grains. In the commercial weight, the pound is divided into 2 marks, 16 ounces, or 32 loths; the ounce into 2 loths, 8 quentins, 32 pfenings, or 630 ases. This pound answers to 33 loths $2\frac{1}{2}$ pfenings, Cologne weight; that is, $96\frac{1}{4}$ pounds Hamburgh weight answer to 100 pounds Cologne weight; and 103 pounds Hamburgh weight = 110 pounds avoirdupois weight.

At Leipsic, gold and silver are weighed with the Cologne mark. The mark of light ducats is worth about 190 rix-dollars current; the mark of light louis-d'ors, or pistoles, 172 rix-dollars, more or less; and the mark of fine silver, 13 rix-dollars, more or less, all in the new Saxon currency. The mark of wrought silver, in Saxony, is 12 loths (or $\frac{12}{16}$ths) fine. In the commercial weight, the pound is 2 marks, 16 ounces, or 32 loths; and the loth, 4 quintlins, 16 pfenings, 32 hellers, or 240 grains: 102 pounds of the Leipsic heavy weight, or a centner of 110 pounds of the common weight, answer to 113 pounds avoirdupois nearly; or 35 pounds of Leipsic common weight = 36 pounds avoirdupois. The commercial weight of Leipsic is the standard weight all over Saxony.

At Milan, gold and silver are weighed by the mark of 8 ounces; the ounce being 24 denari, or 576 grani. The mark of Milan weighs 7 ounces 16 deniers 10 grains, French poids de marc, or 3629 English grains: hence 192 marks of Milan answer to 121 pounds English troy, or 128 ounces of Milan to 121 ounces English troy.

At Mantua, the weight for gold and silver is the same as in Milan; but the commercial weight of Mantua is about 2 *per cent.* lighter, or 100 pounds of Mantua = $63\frac{1}{2}$ pounds avoirdupois.

For further particulars, see the names of the several countries and principal towns in this dictionary; and for a fuller account, see Kelly's Universal Cambist., vol. i.

Mark is also used among us for a money of account; and, in some other countries, for a coin.

The English mark, formerly in circulation, is two-thirds of a pound sterling, or 13*s.* 4*d.*; and Matthew Paris observes, it was of the same value in 1194. The ancient Saxons, as many antiquarians have supposed, called the marc *mancus*, or *mancusa*, and *mearc*; among them it was equivalent to thirty pence, *i. e.* to seven shillings and sixpence of our money. But Dr. Milles, dean of Exeter, has lately suggested that the mancus and mark were not the same. Mr. Clarke observes, that the Danish silver mark was 20*s.*, or one hundred Saxon pennies; and that the gold mark was twelve times as much; whereas the French mark was 13*s.* 4*d.* or one hundred and sixty pence: and he has shewn, that the method of computing by the silver mark was introduced later into France, where it commenced between A.D. 1075 and 1093, than into England. He discovers traces of it in England from the Danish kings till after the time of Henry II. The gold coin struck from Edward III. to Edward IV. were divisions of the mark, as half-marks, quarter-marks, and half-quarter-marks, at 6*s.* 8*d.*, 3*s.* 4*d.*, 20*d.* each: but from Edward IV., when our connections with France ceased, the old way of computing by the pound came again into fashion; but, as that by marks was jointly used, angels, and angelots, or half angels at 6*s.* 8*d.* and 3*s.* 4*d.* each, passed sometimes as parts of them. However, about 40 years afterwards, this regard to the marks in our coins was quite laid aside, and all the principal gold coins were struck in proportion to the pound sterling. Connexion of the Roman, Saxon, and English Coins, &c. p. 307, &c.

The mark-lubs, or Lubec-mark, used at Hamburgh, is also a money of account, equal to $2\frac{2}{3}$ shillings Flemish, or 32 grotes; consequently the shilling or sol-lubs is 2 grotes or pence Flemish. The rix-dollar is 3 marks, 48 shillings, or 576 pfenings. The rix-dollar of exchange is 2 marks, 32 shillings, or 384 pfenings. The pound Flemish is $2\frac{1}{2}$ rix-dollars, $7\frac{1}{2}$ marks, 20 shillings Flemish, 120 shillings lubs, 240 grotes Flemish, 720 dreylings, or 1440 pfenings. Each mark is divided into sixteen sols lubs.

At Copenhagen, accounts are kept in rix-dollars of 6 marks, or 96 shillings Dansk or Danish; and this is the general way of keeping accounts throughout Denmark, except in the duchies of Holstein and Sleswick, where they are kept in rix-dollars of 3 marks, or 48 shillings lubs; and at Elsineur on the Sound, where they are kept in rix-dollars of 4 orts, or 96 skillings Danish. The base rix-dollar (slet-daler), an imaginary coin, is reckoned at 4 marks, or 64 skillings Danish. A mark is divided into 16 skillings or shillings; and a skilling into 2 fyrkes, 3 wittens, or 12 pfenings Danish. The Danish denominations of marks and shillings

ſhillings have only half the value of the ſame denomination in lubs or Hamburgh money: thus, 2 marks Daniſh are worth 1 mark Hamburgh, &c. In coins, the effective rix-dollar, in which the bank of Altona keeps its accounts, is reckoned at 6 marks Daniſh: in the Sundiſh ſpecie, in which the tolls are paid by ſhips ſailing through the Sound, this coin is about $2\frac{5}{6}$ *per cent.* worſe than the former; or, more correctly, 472 rix-dollars Sundiſh ſpecie = 459 rix-dollars ſpecie: crown money is $15\frac{35}{81}$ *per cent.* lower than ſpecie; Daniſh currency, in which the books of merchants and tradeſmen are kept, which is $6\frac{1}{4}$ *per cent.* worſe than crown money, and $22\frac{11}{12}$ *per cent.* worſe than ſpecie; and Holſtein currency, in which accounts are kept in Holſtein and Sleſwick, is 25 *per cent.* below ſpecie. The coins of Denmark are, in gold, ducats ſpecie, which, as well as Dutch ducats, are worth 14 marks 12 ſhillings Daniſh currency, more or leſs; current ducats coined ſince 1757, at 12 marks Daniſh currency; Chriſtian-d'ors, coined in Holſtein ſince 1775, which are worth about 13 marks lubs, or 26 marks Daniſh currency. In ſilver, the ſpecie rix-dollars paſs for 7 marks 6 ſkillings Daniſh currency, and are commonly reckoned at 6 marks 12 ſkillings crown money, at the toll on the Sound; double, ſingle, and half crowns, at 8, 4, and 2 marks crown money, or 8 marks 8 ſkillings, 4 marks 4 ſkillings, and 2 marks 2 ſkillings current; double and ſingle pieces called Ebrœers or Juſtus Judex, at 28 and 14 ſkillings; rykforts at 24 ſkillings, and pieces of 15, 10, 8, 4, and 2 ſkillings currency. In copper, pieces of 1 ſkilling Daniſh; fyrkes or $\frac{1}{4}$ ſkillings; and dreylings or $\frac{1}{4}$ ſkillings. The new Holſtein currency, coined ſince the year 1788, conſiſts of ſpecie rix-dollars, at 48 ſkillings ſpecie, or 60 ſkillings Holſtein currency; and pieces of 32, 16, 8, 4, and 2 ſkillings ſpecie, or 40, 20, 20, 5, and $2\frac{1}{2}$ ſkillings Holſtein currency. In this money, the Cologne mark of fine ſilver is coined into $9\frac{1}{4}$ rix-dollars ſpecie, or $11\frac{9}{16}$ rix-dollars currency. Silver in bars is taken at the Daniſh banks at the rate of $9\frac{1}{4}$ rix-dollars *per* mark fine, provided it is not under 13 loths fine. Foreign gold coins in Denmark paſs as follow: piſtoles, Fredericks, and ſuch like coins, for 12 marks 11 ſkillings lubs; carolins for 15 marks 9 ſkillings ditto; guineas for 15 marks 12 ſkillings ditto; old French louis-d'ors for 15 marks 7 ſkillings ditto; Portugal pieces of 6400 rees for 27 marks ditto; ducats for 7 marks 3 ſkillings ditto, or double the value in marks and ſkillings Daniſh: 67 of the ducats ſpecie, coined by the king of Denmark as duke of Holſtein, being of the ſame weight and fineneſs as thoſe of the empire, ſhould weigh a Cologne mark, $23\frac{2}{3}$ carats fine; $85\frac{3}{8}$ ducats currency muſt contain a Cologne mark of fine gold, and they are little more than 21 carats fine. From a Cologne mark of fine ſilver, $62\frac{1}{2}$ marks in crowns, or 68 marks in ſilver currency ſhould be coined; and by a royal edict of 1776, $9\frac{1}{4}$ rix-dollars ſpecie are to contain a mark of fine ſilver, each piece weighing 537,69 eſchen, Cologne weight, or 447.9 Engliſh grains, and being 14 loths or $\frac{14}{16}$ths fine; ſo that it contains 391.9 Engliſh grains of fine ſilver. The rix-dollar Daniſh currency, in current ducats or 12 mark-pieces, is equivalent to 28.48 German aſes, or $21\frac{1}{8}$ Engliſh grains of fine gold; and the ſame rix-dollar, in ſilver currency, contains 429 aſes, or 318 grains of fine ſilver: the rix-dollar in crowns may be valued at 467 aſes, or $346\frac{1}{2}$ grains of fine ſilver; thus the proportion of gold to ſilver is as $15\frac{9}{69}$ to 1. See Rix-dollar.

The pound, gold and ſilver weight, contains 2 marks, 16 ounces, or 32 lods; the lod, four quintins, 16 orts or pfenings, or 272 eſchen. This is called Cologne weight, but it is ſomewhat heavier, 608 marks of the Daniſh weight being equal to 611 marks of the Cologne weight; ſo that the Daniſh mark weighs 3625 Engliſh grains; 160 ounces Daniſh ſilver weight are equivalent to 151 ounces Engliſh troy weight; and 240 marks, or 120lbs. Daniſh ſilver weight = 151lbs. troy. The commercial weight is to the gold and ſilver weight as 17 to 16, and the pound has the ſame diviſions; it weighs 7703 Engliſh grains; and 100lbs. of Copenhagen = 110lbs. avoirdupois. Kelly's Univerſal Cambiſt. vol. i.

Mark, *County of*, in *Geography*, a principality of Germany, bounded on the N. by the county of Recklinghauſen, and biſhopric of Munſter, on the E. by the duchy of Weſtphalia, on the S. by the duchy of Berg, and on the W. by the duchies of Berg and Cleves. The ſoil of this county is fertile; it has good meadows, and alſo arable land, which produces wheat, rye, barley, oats, buckwheat, peas, beans, rape, turnip ſeed, flax, and hemp, in ſuch plenty as to ſupply neighbouring countries. It furniſhes alſo all kinds of fruits and legumes. Its mountains yield coal, iron, lead, copper, and ſilver ores, and quarries of ſtone. It contains more than 20 towns; its inhabitants are partly Roman Catholics and partly Proteſtants, all of whom enjoy the free exerciſe of their religion. The manufactures of the country furniſh commodities for exportation; and eſpecially articles of wrought iron and ſteel. The ancient counts of Mark derived their origin from the counts of Altona; and this territory was transferred, after having been poſſeſſed by Adolphus V. count of Mark and of Cleve, together with Cleve, to the electoral houſe of Brandenburg. The capital is Hamm.

Mark *Burgel*, a town of Germany, in the principality of Culmbach; 13 miles N.W. of Anſpach.

Mark *Lenkarſheim*, a town of Germany, in the principality of Culmbach; 14 miles N. of Anſpach.

Mark *Manſee*, a town of Auſtria; 10 miles N. of St. Wolfgang.

Mark *Maſſareen*, a town of Syria, in the pachalic of Aleppo, containing about 150 houſes; it is generally the halting place for the caravans between Scanderoon and Aleppo.

Mark *Oldendorf*, a town of Weſtphalia, in the biſhopric of Hildeſheim; ſix miles W. of Eimbeck.

Mark *Schelken*, a town of Tranſylvania; four miles N. of Stoltzenberg.

Mark, *St.*, a town of the iſland of Hiſpaniola, ſituated on a bay, on the W. coaſt, to which it gives name. The chief productions of the vicinity are ſugar, indigo, coffee, and cotton; 48 miles from Port Paix. N. lat. 19° 18'. W. long. 72° 42'.—Alſo, a river of Eaſt Florida, which runs into Apalache bay, a little below the town of St. Mark. —Alſo, a ſea-port town of Eaſt Florida, near the mouth of the river juſt mentioned. N. lat. 30° 10'. W. long. 84° 36'.

Mark, *Goſpel of St.*, in *Biblical Hiſtory*, a canonical book of the New Teſtament, being one of the four goſpels. Mark the evangeliſt is mentioned in 1 Pet. v. 13, and Dr. Lardner ſuppoſes, for reaſons which he has adduced, that he was the ſame with John Mark, whoſe name occurs in the Acts and in ſome of St. Paul's epiſtles, and accordingly that he was the fellow labourer of Paul, and Barnabas, and Peter. He was the ſon of Mary, a pious woman at Jeruſalem, and an early believer, at whoſe houſe the diſciples uſed to meet, and to which Peter frequently reſorted. (Acts, xii. 12.) The deliverance of Peter recorded in this paſſage, happened in the year 44. At this time Mark, called in

Col.

Col. iv. 10, "fifter's fon to Barnabas," went from Jerufalem to Antioch with Paul and Barnabas; and foon after, he accompanied them to other countries as their minifter (Acts, xiii. 5.); but declining to attend them during their whole progrefs, he returned to Jerufalem, and kept up an intercourfe with Peter and the other apoftles. When Paul and Barnabas fettled at Antioch, after the termination of their journey, we find Mark with them, and difpofed to attend them in their journies. At this time he went with Barnabas to Cyprus; and afterwards he accompanied Timothy to Rome, in confequence of the particular requeft of the apoftle Paul, during his confinement in that city. (2 Tim. iv. 11.) From Rome he probably went to Afia, where he met with St. Peter, with whom he returned to this city, and where he is fuppofed to have written and publifhed his gofpel. Such are the outlines of the hiftory of this evangelift, furnifhed by the New Teftament. From Eufebius, Epiphanius, and Jerom we learn, that Mark, after he had written his gofpel, went to Egypt, and founded a church at Alexandria, where, according to the laft of thefe ancient writers, he died in the eighth year of Nero, and was buried. Some authors have afferted, that he died a martyr; but this fact is not mentioned by Eufebius, or other more ancient writers; and the expreffions of Jerom feem to imply a natural death. Fabricius, in his account of St. Mark, fays nothing of his having been a martyr. From various authorities cited by Dr. Lardner, it appears that the evangelift Mark was a companion of Peter in the latter part of his life, and that he had great advantages from that apoftle's preaching for compofing a gofpel; and that he was well acquainted with Barnabas and Paul, and other apoftles and difciples, who had been eye-witneffes of Jefus, befides Peter. Some have fuppofed, that he was one of Chrift's 70 difciples; but whether this was the cafe or not, of which there is no decifive evidence, he was an early believer, and an early difciple and companion of the apoftles, and intimately converfant with them, and thus, as well as by hearing Peter preaching in Judea, and other places, and laftly at Rome, he was well qualified for writing a gofpel.

St. Mark wrote his gofpel at Rome, where he accompanied St. Peter, in the year of Chrift 64 or 65. Many of the moft ancient writers affert, that St Mark was no more than an amanuenfis or interpreter to St. Peter, who dictated this gofpel to him; others affirm that he wrote it after St. Peter's death. It is probable that it was compofed long before Peter's death, and that it was not publifhed, or did not become generally known, till after the death of Peter and Paul. This gofpel appears, from the accounts given of it by the ancients, to contain the fubftance of Peter's preaching: and the gofpel itfelf affords evidences of its being written according to that apoftle's difcourfes, or according to information and directions given by him to this evangelift. Many circumftances tending to Peter's honour, and recorded by the other evangelifts, are not mentioned in this gofpel. (See Matt. xvi. 16—20. compared with Mark, viii. 29, 30. Matt. xvii. 24—28. compared with Mark, ix. 30—33. Luke, xxii. 31, 32. John, xiii. 6, &c John, xviii. 10. compared with Mark, xiv. 47. John. xxi. 7. John, xxi. 15. John, xxi 18, 19) However, there are many things that occur in this gofpel, which are omitted by the other evangelifts, fee Mark, i. 13. 20. 29. 33. 35, 36, 37. 45. ii. 2. iii. 5, 6. 17. 19. iv. 26—29 34. 36. 38. v. 1. 19. vi. 13. vii. 2, 3, 4. 21, 22. 31. 37. viii. 22—26. x. 46. 52. xi. 13. xii. 41. 44. xiii. 3, 4. xiv. 51, 52. xv. 21. xvi. 7.; and this fact proves, that Mark was not an epitomizer of Matthew, as fome have fuppofed, nor of any other author, and that he was well acquainted with the things of which he undertook to write a hiftory. He writes as an eye-witnefs, or as one who had full and authentic information at the firft hand. Hence Lardner juftly concludes, that St. Mark's gofpel, though fhort, is a very valuable and mafterly performance. The learned have been divided as to the language this gofpel was wrote in, fome affirming it was compofed in Greek, which is the more general and probable opinion, others in Latin. Several of the ancient heretics received only the gofpel of St. Mark: others, among the Catholics, rejected the twelve laft verfes of this gofpel. But Dr. Lardner refers thofe who doubt the genuinenefs of this part of the gofpel, for fatisfaction, to Dr. Mill, and to the obfervations of Grotius, at the beginning of that chapter, and to Beza upon the ninth verfe; and for explaining thofe twelve verfes, and reconciling them with other evangelifts, he refers to Grotius and other commentators. Lardner's Works, vol. vi.

Mark, *St.*, *Canons of*, a congregation of regular canons, founded at Mantua, by Albert Spinola, a prieft, towards the end of the twelfth century.

Spinola made a rule for them, which was approved, corrected and confirmed, by feveral fucceeding popes. About the year 1450 they were reformed, and followed only the rule of St. Auguftine.

This congregation, which at firft confifted of eighteen or twenty houfes of men, and of fome for women, fituate in Lombardy, and the ftate of Venice, having flourifhed for the fpace of four hundred years, declined by little and little, and was at length reduced to two convents; and in 1584, that of St. Mark, at Mantua, which was the chief, was given, by the confent of pope Gregory XIII. to the Camaldulians; and fo the congregation became extinct.

Mark, *St*, *Knights of*, an order of knighthood in the republic of Venice, under the protection of St. Mark the Evangelift.

This order was inftituted in the year 737, the reigning doge being always grand mafter: it was always in great efteem, being only conferred on thofe who had performed fignal fervices to the commonwealth The badge of the order is a medallion of gold richly chafed, with a winged lion fejant, the wings elevated, holding in his finifter paw a fword erect, the dexter refting upon a book open; upon it are thefe words, "Pax tibi, Marce, Evangelista meus:" on the reverfe, the portrait of the reigning doge, with the image of St. Mark, delivering a ftandard to him. The medal is worn at the breaft, pendant to a chain of gold.

Mark, in *Law*, is the fign of the crofs affixed by the illiterate vulgar, to deeds, &c. when unable to write their names. See Seal.

Mark, in the *Manege*. A horfe marks, that is, he fhews his age by a black fpot, called the bud or eye of a bean, which appears, when he is five and a half, in the cavity of the corner teeth, and is gone when the horfe is eight years old. After that age he ceafes to mark, and is faid to have razed. See Age in *Horfemanfhip*, and Eye *of a Bean*.

Mark, in *Rural Economy*. See Land-*mark*.

Mark, *Sea*, in reference to *Navigation*, &c. See Beacons.

Mark, *Letters of*. See Letters and Marque.

Mark-*Statutes*, are graduated ftakes or pofts to fhew the rife or fall of water in a river, canal, or refervoir.

MARKAN, or Markhan, in *Geography*, a town of Grand Bucharia; 70 miles N.W. of Balk.

MARKARYD, a town of Sweden, in the province of Smaland; 50 miles S.W. of Wexio.

MARKDORF, or MARCHDORF, a town of the duchy of Baden; nine miles N.E. of Conftance. N. lat. 47° 45. E. long. 9° 22.

MARKEN, a fmall ifland on the weft fide of the Zuyder fee, near the coaft of Holland; two miles E. of Monikedam.

MARKERSDORF, a town of Saxony, in the circle of Neuftadt; fix miles E. of Weyda.

MARKESDORF, a town of Bohemia, in the circle of Leitmeritz; four miles S. of Kaunitz.

MARKET, a public place in a city or town, where provifions are expofed to fale.

The word is formed from the French, *marché*, which fignifies the fame.

MARKET is alfo ufed for a liberty or privilege, either by the king's grant, or by long and immemorial ufage and prefcription, which prefuppofes fuch a grant, whereby a town is enabled to keep a market.

If any perfon fet up a fair or market fo near mine that he does me a prejudice, it is a nuifance to the freehold which I have in any market or fair; but in order to its being a nuifance, it is neceffary, 1. That my market or fair be the elder, otherwife the nuifance lies at my own door; 2. That the market be erected within the third part of 20 miles from mine. For fir Matthew Hale (on F. N. B. 184.) conftrues the *dieta*, or reafonable day's journey, mentioned by Bracton (l. 3. c. 16.) to be 20 miles; as it is ufually underftood, not only in our own law (2 Inft. 567.), but alfo in the civil (Ff. 2. 11. 1.) from which we probably borrowed it. So that if the new market be not within feven miles of the old one, it is no nuifance; for it is held reafonable, that every man fhould have a market within one-third of a day's journey from his own home; that, the day being divided into three parts, he may fpend one part in going, another in returning, and the third in tranfacting his neceffary bufinefs there. If fuch market or fair be on the fame day with mine, it is *prima facie* a nuifance to mine, and there needs no proof of it, but the law will intend it to be fo; but if it be on any other day, it may be a nuifance; though whether it is fo or not, cannot be intended or prefumed, but I muft make proof of it to the jury. Blackft. Com. book iii. See FAIR.

In former times, it was cuftomary to have moft fairs and markets kept on Sundays, and in the church-yard, fo that matters of bufinefs and devotion were tranfacted all at the fame place and time; which cuftom, though prohibited by feveral kings, particularly 13 Ed I. ftat. 2. cap. 6. was yet held up till the reign of king Hen. VI. when it was effectually fuppreffed, 27 Hen. VI. cap. 5. In many places they are ftill kept in the church-yard.

In the country, things fold in the markets, are to be in the ufual place appointed for the fale; and market overt is only held on the fpecial days, provided for particular times by charter or prefcription; but in London every day, except Sunday, is market-day (Cro. Jac. 68.), and every fhop is a market overt, for fuch goods as are put there, to be fold by the trade of the owner (5 Rep. 83. 12 Mod. 521.); though if the fale be in a warehoufe, and not publicly in the fhop, the property is not altered. Sale upon a Sunday, though in a fair market, will not alter the properties of the thing fold. If my goods are ftolen from me, and fold, out of market overt, my property is not altered, and I may take them wherever I find them.

Perfons that dwell in the country, may not fell wares by retail in a market-town, except in open fairs; but countrymen may fell goods in grofs there. (1 and 2 P. and M. cap. 7.) All contracts for any thing vendible in fairs or markets overt fhall be binding, and fales alter the property, if made according to the following rules. 1. The fale is to be in a place that is open, fo that any one who paffeth by may fee it, and be in a proper place for fuch goods. 2. It muft be an actual fale, for a valuable confideration. 3. The buyer is not to know that the feller hath a wrongful poffeffion for the goods fold. 4. The fale muft not be fraudulent, betwixt two, to bar a third perfon of his right. 5. There is to be a fale and a contract, by perfons able to contract. 6. The contract muft be originally and wholly in the market overt. 7. Toll ought to be paid, where required by ftatute. The Mirror informs us (c. 1. § 3.), that tolls were eftablifhed in order to teftify the making of contracts, for every private contract was difcountenanced by law; infomuch that our Saxon anceftors prohibited the fale of any thing above the value of 20 pence, unlefs in open market, and directed every bargain and fale to be contracted in the prefence of credible witneffes. 8. The fale ought not to be in the night, but between fun and fun; though if the fale be made in the night, it may bind the parties. Sale of goods ftolen in London, or within two miles thereof, to brokers, &c. alters not the property. 1 Jac. I. cap. 21.

In market overt, if the goods be the property of the king, fuch fale (though regular in all other refpects) will in no cafe bind him; though it binds infants, feme coverts, idiots, or lunatics, and men beyond fea or in prifon; or if the goods be ftolen from a common perfon, and then taken by the king's officer from the felon, and fold in open market; ftill if the owner has ufed due diligence in profecuting the thief to conviction, he lofes not his property in the goods. (Bacon's Ufe of the Law, 158.) So likewife, if the buyer knoweth the property not to be in the feller, or there be any other fraud in the tranfaction; if he knoweth the feller to be an infant or feme covert not ufually trading for herfelf; if the fale be not originally and wholly made in the fair or market, or not at the ufual hours (according to the rules above fpecified); the owner's property is not bound thereby. (2 Inft. 713, 714.) If a man buys his own goods in a fair or market, the contract of fale fhall not bind him, fo that he fhall render the price; unlefs the property had been previoufly altered by a former fale. (Park. § 93.) And, notwithftanding any number of intervening fales, if the original vendor, who fold without having the property, comes again into poffeffion of the goods, the original owner may take them, when found in his hands who was guilty of the firft breach of juftice. (2 Inft. 713.) By which wife regulations, the common law has fecured the right of the proprietor in perfonal chattels from being devefted, fo far as was confiftent with that other neceffary policy, that purchafers, *bonâ fide*, in a fair, open, and regular manner, fhould not be afterwards put to difficulties by reafon of the previous knavery of the feller. But there is one fpecies of perfonal chattels, in which the property is not eafily altered by fale, without the exprefs confent of the owner, and thofe are horfes. (2 Inft. 719.) For a purchafer gains no property in a horfe that has been ftolen, unlefs it be bought in a fair or market overt, according to the directions of the ftatutes 2 P. and M. c. 7. and 31 Eliz. c. 12. See HORSE.

A piepowder court is incidental to a market, as well as a fair. (See COURT.) Keeping a fair or market, otherwife than it is granted, as on two days, when only one is granted, or on any other day than that appointed, &c. is caufe of forfeiture. And if a perfon erects ftalls in a market, and does not leave room for the people to ftand and fell their wares, fo that they are thereby forced to hire fuch ftalls, taking money for the ufe of them is extortion.

Market, *Court of the Clerk of the.* See Clerk *of the Market.*

Market, *Clerk of the*, in the king's houſhold. See Clerk.

Market-*towns.* See Towns.

Market, in *Rural Economy*, the town or place where any kind of articles, whether for the purpoſe of conſumption as food, or other means, are expoſed to ſale. The advantages of having theſe near and convenient, are of vaſt importance to the farmer in the diſpoſal of his different products. And in this view it becomes the duty of every farmer, before renting a farm, to carefully aſcertain its ſituation in regard to markets for the ſale of agricultural productions. The markets in the more fertile and populous parts of this country, are in general, a late writer ſuppoſes, good, and by means of turnpike-roads, inland navigations, or ſea-carriage, eaſy of acceſs; but were the regulations which have been propoſed to be adopted by government, reſpecting the ſale of grain eſtabliſhed, and one general ſtandard for weights and meaſures fixed upon, they would be ſtill more improved. The ſtate of the markets in the remote parts of this part of the iſland, as well as Scotland, is very materially different; and while the proprietors of theſe diſtricts remain ſo inattentive to their own intereſts, it is not probable that any material alteration will take place for the better. The loſs and inconvenience which the Welſh and Highland farmers are often ſubjected to, by being obliged to diſpoſe of their cattle on credit, are very great, and require the exertion of the chief proprietors in the particular diſtricts, to apply with effect in order to remove them. In theſe diſtricts, it is ſuppoſed, the cultivators of grain are as ill ſituated, in regard to markets, for the ſale of the produce of their farms, as thoſe who keep breeding ſtocks of cattle and ſheep. The effects of the want of markets, as deſcribed in the Report of Pembrokeſhire, applies very particularly to them. "The number of inhabitants, who live by handicraft buſineſs, or who buy their proviſions, is but ſmall in proportion to thoſe employed in agriculture, which occaſions the demand for corn and butcher's-meat in our markets to be ſmall. Hence, thoſe who grow a large quantity of corn, find a great difficulty in ſelling it. We have corn-dealers at the ports, who purchaſe corn during the autumn and winter months, at a price always much below what is ſold at the ſame time in the open markets. When wheat is ſix ſhillings the buſhel in the market, the dealers will hardly give five, and other grain in proportion. The reaſons for this difference between the dealer's price and the market price are theſe; he buys with a deſign to export his corn to Briſtol, or ſome other Engliſh port; he muſt take care in buying, to provide for ſtore-houſe rent, porterage, freight, inſurance by ſea, commiſſion on ſales at the port he ſends it to; and, laſtly, for his own trouble and capital employed. Beſides all theſe expences, he runs another material riſk: our corn is generally ſo damp, that it will not keep in the lofts without being laid thin, and turned at leaſt once a-week. If, in going to a port, a veſſel meets with contrary winds, and is delayed on her voyage, the cargo frequently heats to ſuch a degree, as to reduce its price below prime coſt, and then the dealers ſuffer a great loſs by the venture." From this acconnt of the ſtate of the markets in the remote parts of this country, it is ſuppoſed, "may be inferred, the advantages which the proprietors of ſuch diſtricts would derive by eſtabliſhing manufactures, whereby markets would be brought home, as it were, to every farm. Where that cannot be effected, inland navigations, where practicable, as being infinitely preferable to turnpike-roads for the carriage of corn to market, and for bringing manures in return, ought to become the next object of the proprietor's attention. By theſe the poſſeſſors of diſtant corn farms, are often put nearly upon a footing with thoſe in the more immediate neighbourhood of the beſt markets in the country. But it may frequently happen, that it would be impracticable to eſtabliſh extenſive manufactures, ſuch as would have the effect of creating a market for the ſurplus produce of a diſtrict, and phyſically impoſſible to form canals, ſo as to open a communication with other diſtant markets; in ſuch caſes, good level well made roads are the only alternative. Theſe, although an expenſive mode of conveyance, are highly beneficial, particularly in inland diſtricts remote from markets, and where it is impoſſible to form canals. Corn and meal are frequently carried in very great quantities from the ſouthern counties of Scotland, to the Edinburgh and Glaſgow markets, which, without turnpike-roads, would ſcarcely be practicable, at leaſt the expence to the farmers would be ſo great as to amount almoſt to a prohibition, and would neceſſarily compel them to turn their attention to breeding and grazing, rather than the tillage ſyſtem of huſbandry, which, under ſuch circumſtances, would certainly turn out the moſt profitable." The degree in which the ſituation of a farm is, in regard to markets, muſt obviouſly influence both proprietors and tenants, in making choice of particular rotations or modes of cropping in preference to others. Where no exertions can approximate markets to a farm, which would otherwiſe be well adapted to the cultivation of grain, breeding and grazing cattle, or other ſpecies of live ſtock, is, it is ſuppoſed, the beſt method in which ſuch farm can be occupied. Theſe, if not ſold in the diſtrict, can be carried to diſtant markets almoſt without roads, and at a comparatively trifling expence. Were the markets for the ſale of cattle in the north of Scotland and in Wales, as well regulated as in other parts of this kingdom, the moſt beneficial conſequences would enſue, as, except in theſe diſtricts, ſcarcely any improvement can be ſuggeſted. The dealers in cattle reſiding in the various diſtricts of Scotland, except thoſe in the ſouth and ſouth-weſt, generally move their cattle ſouthward at two ſeaſons, Auguſt and October; at which periods, what may be called the two great national markets for the ſale of black cattle are held at Falkirk in Stirlingſhire. There it is not uncommon to ſee 30 or 40,000 black cattle exhibited for ſale in one day; theſe being either purchaſed by dealers from England, or by ſome of the principal people in that line in Scotland, and thence driven forward to markets in the former part of the country. Probably nineteen out of twenty of the Scotch cattle enter this country by the way of Carliſle; and matters are ſo contrived, that there are cattle fairs, one ſucceeding another at proper intervals, during the whole courſe of the journey from the laſt place to the ſouthern parts of Surry. From Carliſle to the ſouthern parts of Yorkſhire, the droves are conducted along the ſame line of road. They are then branched off from the great London road in different directions; ſome going through the eaſtern parts of the country towards Norfolk, Suffolk, and Eſſex; and the remainder through the weſtern part of Nottinghamſhire, Leiceſterſhire, Northamptonſhire, Buckinghamſhire, &c.; and ſuch as are not ſold in theſe diſtricts, are ſent to Barnet in Middleſex, as a centre, and are there expoſed to ſale. When any of them remain unſold after Barnet fair, which, owing to a combination of unfavourable circumſtances, ſometimes happens, they are ſent forward to markets in Surry, Dorſet, &c. which alſo ſucceed each other in the ſame manner. "From this arrangement, were the farmers in the remote diſtricts to receive ready money for their cattle when ſold, it is preſumable, that from the competition

competition which generally takes place among the dealers at the provincial fairs, they would receive a fair adequate price, confidering the rifk of lamenefs or death, bad fales, and the great expence attending driving cattle to fuch diftant markets."

In the Agricultural Report of the Weft-Riding of Yorkfhire, it is obferved, that a "very confiderable corn-market is held at Knarefborough in that county, where dealers from the weftern parts of the riding attend, and purchafe grain from the farmers in that neighbourhood; a great part of which is re-fold at Shipton-market, in Craven, and carried ftill farther weftward, where corn is fcarce, and gives employment to a number of people who are concerned in this traffic. It is under circumftances of this kind that public markets for grain can be confidered as advantageous to the growers or purchafers of corn. The firft cannot get his commodity difpofed of at home, hence willingly goes a ftage to meet his merchant; and the latter being fure to meet with a fupply, attends upon market day, with his horfes and carts, for conveying it to the place where he is to ufe it, or difpofe of it again. By this mode no time is loft, no unneceffary labour incurred; whereas, were all the grain in the kingdom to be fold in the public market, as fome wild imaginations recently propofed, a great wafte of both muft neceffarily happen. Let us juft fuppofe, that fuch a law had been paffed, and that the grain fold at Knarefborough was not to be drove to the weft bounds of the riding, but that it was wholly to be confumed in the neighbourhood of that place; and fay where would be the advantage arifing from fetting down the facks in the market? It might happen that a baker or maltfter purchafed the very wheat or barley which was grown by his next door neighbour, but which, in confequence of fuch miftaken law, could not be fold without being firft offered to fale in this public manner. Would not the trouble of driving it to market by the farmer, and of driving it back again by the baker or maltfter, be juft fo much loft labour to them, without affording the fmalleft advantage, nay, rather occafioning a pofitive lofs to the public confumer, upon whom every expence of this kind muft neceffarily fall in the end?" And Mr. Donaldfon very juftly concludes on the fubject of grain, from what has happened in the fcarcities of this article in France during the adminiftration of M. Neckar, and more recently in this country, that "while every perfon muft agree, that the regulation of the public markets of the country falls naturally and properly under the direction of the legiflature, it is believed there are none who fuppofe that, during an impending fcarcity in this ifland, it is either a prudent meafure, or one likely to alleviate the evil, that the fervants of the crown fhould become the national importers. The unfettered fpeculations of the merchant are the only refource to be depended upon, under fuch circumftances, for an abundant fupply of the markets. See CORN *Laws*, and BOUNTY.

Mr. Middleton remarks, in refpect to the caufes that increafe the price of animal food in the markets, that "a fcarcity of vegetable food for the fattening of cattle, from whatever caufe it may arife, whether from a droughty fummer, or a fevere winter, uniformly produces full markets, and a confequent fall in the price of the cattle thus prematurely forced to them;" but that "this temporary great fupply and low price is, as certainly, quickly followed by a correfponding dearth of fat cattle, and confiderable advance in the price of animal food. This circumftance, therefore, though it firft lowers the price to below, and then advances it to above par, has a tendency, *on the whole*, to augment the prices, becaufe, at fuch a time, the beafts and fheep are fent to market with much lefs beef and mutton on their bones than they ought to have. Hence a dry burning fummer gluts the market with cattle lefs than half fat; four or five months later the markets are very thinly fupplied, and then, of courfe, the prices rife to an extraordinary height. Every fudden and great advance in the rate of animal food may primarily be traced to this caufe. There are, of courfe, other caufes which tend to produce this effect, but they are of flow operation; fuch as the increafing profperity and opulence, which enables a greater number of individuals to live on butcher's meat than formerly; while, in the opinion of fome people, the prefent war has greatly increafed the number of perfons who fubfift principally on animal food. But that a profperous peace would have advanced the price much more, by means of general induftry, and the confequent increafe of wealth, by fuch means.

Mr. Marfhall, in his excellent work on the landed property of England, ftates, that "when we confider how much the value of farm lands depends on their locality with refpect to markets, it becomes an object of high importance to their proprietors to meliorate their fituation in this refpect. And he fuggefts, that there are three methods of improving the value of them in what refpects markets, as by the facilitating the conveyance of the produce to diftant markets; through the means of roads, railways, or water-carriage; by eftablifhing new markets, in fituations where inhabitants have increafed, fince the eftablifhment of thofe which are now frequented; and by an artificial increafe of inhabitants; by drawing together the confumers of produce; by encouraging manufactures upon, or in the vicinity of them. For while a manufactory continues to flourifh, the value of the lands around it cannot fail to be increafed." But that, "before an adventurous fcheme of this kind can be prudently carried into effect, the evil as well as the good which it may bring to the eftate requires to be calculated. A populous manufactory, even while it flourifhes, operates mifchievoufly in an agricultural diftrict: by propagating habits of extravagance and immorality among the lower order of tenantry; as well as by rendering farm-labourers and fervants diffatisfied with their condition in life. And the more it flourifhes, and the higher the wages it pays, the more mifchievous it becomes in this refpect. Moreover, lands bear a rental value in proportion to the rate of living, in the diftrict in which they lie; fo that while a temporary advantage is reaped by an increafed price of market produce, the foundation of a permanent difadvantage is laid. And whenever the manufactory declines, the lands of its neighbourhood have not only its vices and extravagance entailed upon them; but have the vicious, extravagant, helplefs manufacturers themfelves to provide for. This, however, only applies to particular kinds of manufactories." In this country, we have "inftances of manufactures being highly beneficial to agriculture. The linen manufacture of Yorkfhire, and the woollen manufacture of Devonfhire are fo; and have been fo during a length of time. And "the moft intimate connection between them is, where the grower manufactures his own produce. And this priftine connection is ftill found in the ifland. In North Wales, the character or callings of fheep-farmer and woollen manufacturer are joined in the fame perfon. The wool is carded and fpun, and the yarn woven, under the roof of the grower. If the farmer himfelf does not throw the fhuttle, he employs a labourer or labourers, who affift alternately, and, as the feafons or circumftances require, in the works of agriculture and manufacture." And that "a fimilar kind of reciprocal benefit arifes from the cotton manufactures of this country, where not only the fpinners, but the weavers, affift occafionally in the works of hufbandry;—in weeding, hay-making, and harveft-works: an advantage which, in an hazardous feafon, is at once a private and a public good. And add to this another advantage of village manufacturers. When, in the uncertainty of commercial concerns, the demand flags for a time, the country finds, that, inftead of having a load of enfeebled artificers, mere manufacturers, to fupport in idlenefs, it thereby acquires an additional fupply of ufeful hands, enured to the works of the field, to forward its cultivation, and affift in its improvements. While at all times the increafe of inhabitants which this valuable fpecies of manufactory fupplies, increafes the demand for marketable produce in the immediate neighbourhood of its growth." This can, however, only be the cafe of a few inftances, as manufacturing labourers are feldom ufeful for farm-bufinefs. This is much the cafe in Lancafhire, and other large manufacturing diftricts.

In the Rural Economy of the Midland Diftrict, it is ftated, "that markets ought to be adapted to the mutual advantage of the producers and confumers at large, but particularly to thofe of the peculiar town or neighbourhood. And, therefore, that hucksters may be injurious to fuch markets, both by being too freely admitted, as well as by being wholly excluded, as mere market towns moftly depend for their fupplies upon the market day, when, in a time of fcarcity, fuch dealers may in a very fhort time clear the market, and leave the inhabitants deftitute of the week's provifions; while, on the contrary, when totally precluded from even purchafing the furplus, the market itfelf, as well as the inhabitants, muft be injured, as the producer will, of courfe, endeavour to find another market where he can fell his produce with certainty, without the rifk of having it to bring home again, or difpofing of it at an under price to the monopolizers of the town; in confequence of which, the market becomes indifferently fupplied, and the articles of inferior quality and more expenfive." It would, therefore, it is fuppofed, be a regulation of great utility, as has been found in actual practice in this diftrict, for the market to open at a ftated time, and to permit no huckfter to become a buyer till an hour afterwards; as by fuch means the inhabitants are certain of a fupply, without the market fuftaining any injury. And Mr. Middleton ftates, in his Report of the State of Agriculture in the County of Middlefex, that, "in regard to the markets, there are in the country part of the diftrict nine weekly ones held, namely, at Barnet, on Monday morning; at Brentford, on Tuefday; at Southall and Finchley, on Wednefday; at Uxbridge, Hounflow, and Edgware, on Thurfday; at Staines, on Friday; and at Enfield on Saturday. That at Uxbridge market a great deal of corn is fold, and there is a large public granary over the market-place, for the purpofe of depofiting it from one week to another. And at Hounflow market there is a confiderable fhow of fat cattle; fuch of which as are not difpofed of there are fent on to Smithfield-market, in the city of London, which is famous for the fale of bullocks, fheep, lambs, calves, and hogs, every Monday; and again, though in a lefs degree, on Friday. On the latter day there is alfo a market for ordinary horfes." And "that this is the only public market within the bills of mortality for the fale of live cattle." He gives the following ftatement of the number of black, or neat cattle, and fheep, annually brought for fale to this market, from the year 1731 to 1795, being 63 years, which he has divided into feven averages of nine years each, namely,

Years.	Cattle.		Sheep.	
1732	76,210		514,700	
1733	80,169		555,050	
1734	78,810		566,919	
1735	83,894		590,970	
1736	87,606		587,420	
1737	89,862		607,330	
1738	87,010		589,470	
1739	86,787		568,980	
1740	84,110		501,020	
Average		83,906		564,650
1741	77,714		536,180	
1742	79,601		503,260	
1743	76,475		468,120	
1744	76,648		490,620	
1745	74,188		563,990	
1746	71,582		620,790	
1747	71,150		621,780	
1748	67,681		610,060	
1749	72,706		624,220	
Average		74,194		559,891
1750	77,765		656,340	
1751	69,589		631,890	
1752	73,708		642,100	
1753	75,252		648,440	
1754	70,437		631,350	
1755	74,290		647,100	
1756	77,257		624,710	
1757	82,612		574,960	
1758	84,252		550,930	
Average		75,351		623,091
1759	86,439		582,260	
1760	88,594		622,210	
1761	82,514		666,010	
1762	102,831		772,160	
1763	80,851		653,110	
1764	75,168		556,360	
1765	81,630		537,000	
1766	75,534		574,790	
1767	77,324		574,050	
Average		83,432		615,328
1768	79,660		626,170	
1769	82,131		642,910	
1770	86,890		649,090	
1771	93,573		631,860	
1772	89,503		609,540	
1773	90,133		609,740	
1774	90,410		585,290	
1775	93,581		623,950	
1776	98,372		671,700	
Average		89,362		627,805
1777	93,714		714,870	
1778	97,360		658,540	
1779	97,352		676,540	
1780	102,383		706,850	
1781	102,543		743,330	
1782	101,176		728,970	
1783	101,840		701,610	
1784	98,143		616,110	
1785	99,057		641,470	
Average		99,285		687,588
1786	92,270		665,910	
1787	94,946		668,570	
1788	92,829		679,100	
1789	93,269		693,700	
1790	113,708		729,660	

Years.

Years.	Cattle.	Sheep.
1791	99,838	729,800
1792	107,263	752,569
1793	116,488	729,810
1794	109,064	717,990
Average	——— 101,075	——— 707,456

The writer, however, "has not been able to procure an account of the number brought to Smithfield in 1795 and 6, but he is pretty fure it muft be greater than that of the preceding year, on account of the unufual advance in the price of animal food having occafioned a very large quantity of lean cattle to be prematurely fent to market." But "in the above account it may be feen, that the fupply has been advancing with fome degree of regularity both in the number of cattle and fheep during the laft forty-five years. The number of cattle now fent to market is more, by 26,881, than it was twenty-five years ago; and of fheep 147,565. And as it is a matter of general notoriety, that the cattle and fheep of England have alfo been gradually and progreffively increafing in their individual weight, owing partly to the attention paid of late years to the improvement of the breed, and partly to their being much better fed now than formerly, and indeed much better than they could poffibly have been before the introduction of turnips and clover; it is not perhaps an unreafonable, or unfounded conjecture, to fuppofe that the increafe, in point of weight, has kept pace with the advance in refpect to numbers, during the aforefaid period. If fo, it will follow," it is conceived, "that, including number and weight, the annual increafe in forty-five years is, in neat cattle, upwards of 72 *per cent.* and in fheep near 53. Upon the whole, he can fafely affirm, that including all the other fupplies of animal food, and confidering that they alfo, as well as cattle and fheep, come to market much better fed, and confequently much increafed in weight, above what they were forty-five years ago, the confumption of the metropolis is at this time full one-half more than it was then." And fince this laft period the increafe has gone on in a progreffive manner.

The following is given as a comparifon between the weight of bullocks, &c. as it was one hundred years ago, and as it is at the prefent time, *viz.*

Animals.		100 years ago.	Now, clofe of 1794.
Bullocks, average, weight of		370 lbs.	800 lbs.
Calves,	ditto	50	140
Sheep,	ditto	28	80
Lambs,	ditto	18	50

It is therefore concluded, that at the end of the above year the annual confumption of London was fomewhere about 110,000 head of neat cattle and 777,000 fheep: and "that any perfon, poffeffing fome degree of judgment in cattle, and at the fame time the defire of looking at a great variety of live ftock, cannot perhaps fpend a few hours more fatisfactorily, than in examining the market at Smithfield. He will there very foon difcover, that, for want of a greater attention to the excellence of breed, both in neat cattle and fheep, a very large proportion of the produce of the foil of this kingdom is wafted in producing bones and offal, inftead of meat." It is indeed aftonifhing, "that men, at leaft in the prefent day, fhould with fo much difficulty be prevailed on to breed beef and mutton, in preference to horns, fkins, and bones." Since this ftatement was made much correction in this refpect has taken place.

But befides thefe markets there are others, as Leadenhall-market, which is the greateft in London, for the fale of country-killed meat, and is the only fkin and leather market within the bills of mortality: and Newgate-market, which is the fecond great place for country-killed meat; and at both thefe markets pigs and poultry killed in the country are fold, together with frefh butter, eggs, &c. to an aftonifhing amount. Thefe laft and many other markets are held daily, and almoft conftantly well fupplied with moft forts of animal food, &c.

And "the three markets of Smithfield, Newgate, and Leadenhall, fupply the butchers round London almoft entirely, and to the diftance of twelve miles; partly indeed to twenty miles. It is a general opinion among the butchers, that they can buy live cattle in Smithfield cheaper than at any other place. The cattle expofed for fale at this market have been drove until they are empty, weary, wafted, and foot-fore, and confequently fhew to a great difadvantage; fo much fo, that graziers who have followed their cattle, efpecially fheep, to Smithfield, frequently do not know their own ftock, and when they have been fhewn to them, they were fhocked at their deteriorated appearance. If they fhould not then be fold and flaughtered, the wafting would continue fo much, that it would require feveral weeks of rich food to raife them to their former fatnefs." And "the bullocks and fheep drove to thefe markets are not only over-heated by the journey, but they are alfo often moft favagely beaten with bludgeons, goaded with darts, and hocked about their legs in the market during, perhaps, ten hours, and then drove to the flaughter-houfe (if they have the good luck to efcape thieves in the characters of bullock-hunters), and knocked down while their blood is yet in that inflamed ftate, and their flefh bruifed. Such meat muft, it is conceived, be very detrimental to the health and longevity of man. Much better is that which is killed in the country without driving, when the animal is in full health, and fent to Newgate and Leadenhall in clean and cool packages. If this could be done by all, it would remove a great nuifance from London, would probably improve the health of its inhabitants, and certainly prevent many, and fometimes fatal, accidents." Befides, there is a fifh-market, which is held every morning at Billinfgate, where all the dealers are ferved very early: firft, thofe who keep fhops in various parts of the town; and next, the hawkers, who, during the forenoon, cry them through the ftreets. This market receives a confiderable portion of its fupply of frefh fifh by land-carriage, from every diftance within the limits of England and parts of Wales. Much is alfo brought from the fea up the Thames in boats, fome even from Norway and Newfoundland, as well as intermediate diftances, packed up in ice. The quantity of dried and pickled falmon, of cod, herrings, and fhell-fifh, is alfo very great. The whole, probably, amounts to about one-fixteenth of the beef and mutton.

And there is likewife one corn-market, which is held at the corn-exchange, in Mark-lane, principally every Monday, but in a lefs degree every Wednefday and Friday. In this market an immenfe quantity of grain is difpofed of, but no ftatement of the exact amount has been hitherto given. The whole feems a fort of monopoly of a moft important and neceffary article, which fhould not, by any means, be fuffered to continue.

And in addition to thefe there are alfo three public markets for hay and ftraw in this county, namely, Whitechapel, Smithfield, and St. James's; all of which are held every Tuefday, Thurfday, and Saturday. And London is likewife in part fupplied with the fame articles from a market held every Monday, Wednefday, and Friday, in Southwark

And "the barracks on Hounflow-heath furnifh a ready market to the farmers in that neighbourhood for their hay, ftraw, and oats, as well as a fund from which to obtain a fupply of manure. In this neighbourhood, fome farmers fell their hay and ftraw to jobbers, who take it at the barn door, alter the weight of the truffes, draw it away in their carts, and re-fell it." In thefe markets "hay is all fold by the load of 36 truffes, each trufs weighing 56 lbs. except new hay which weighs 60 lbs. till the 4th day of September, and afterwards 56 lbs. only; by which regulation a load of new hay, till the 4th of September, yearly, weighs a ton, and after that day only 18 cwt. It is fold daily in large quantities at the different hay-markets, and a regular book kept by the clerk of each market, for the infpection of the public, mentioning the names of the feller, the buyer, the falefman, and the price of each load. This feems to have been intended to fecure a fair and honeft dealing; but it fails, almoft entirely, in effecting fo good a purpofe; great impofitions being practifed.

"The beft meadow hay, is principally bought for the feeding of gentlemen's faddle and coach horfes at from four to fix guineas *per* load; the more ordinary, by the livery-ftable keepers, coach-mafters, and retailers, at from three to five guineas. And the hay of rye-grafs and clover, mixed, is generally bought by coach-mafters, &c. for ordinary draught horfes. The fainfoin and clover hay is generally bought for the brewers, diftillers, and carmen's horfes, for the rack, and for cutting into chaff, at from five to fix guineas and a half the load.

The ftraw from different kinds of grain brought to the London markets, is likewife fold by the load, which confifts of 36 truffes, of 36 lbs. each. Wheat ftraw is generally ufed in the ftables, for bedding of horfes. The rye ftraw is ufed by brick-makers, to cover their bricks, by collar-makers, and for packing. The barley ftraw for packing, and by gardeners. The oat ftraw is alfo ufed for packing, and the winter fupport of cattle, as faddle horfes in ftraw yards, &c. The bean ftraw ferves to litter farm-yards, and farmer's ftables. And the pea ftraw and tare ftraw to feed farmers' horfes in the ftables, and faddle-horfes in ftraw-yards. There are the fame regulations at the different markets with refpect to ftraw as hay, and the price of each fort for fome time paft, has been from 25*s.* to 45*s.* *per* load of $11\frac{1}{2}$ cwt. and 9 lbs. It has been lately confiderably higher in general.

The coal-exchange or market is in Thames-ftreet, "where the dealers buy and fell. But the confumers are not permitted to buy there, owing to the dealers having obtained a completely infamous monopoly of the market. The annual quantity fold is about 600,000 chaldrons. A chaldron of coals, as delivered to the confumer, is thirty-fix heaped bufhels, but it is much larger meafure between the fhip owner and the dealer, and even to fuch confumers as buy five or more chaldrons at a time; an allowance is then made in the term *ingrain*, which increafes the chaldron to full forty bufhels."

It muft be extremely evident that the due regulation and eftablifhment of fuitable and convenient markets muft be of the greateft importance to the fuccefs and improvement of the agriculture of the kingdom, as by fuch means a proper ftimulus or encouragement can only be held out to the farmer to extend his means of cultivation. The inconvenience of the want of markets, may in many inftances be confiderably leffened by the forming of canals and the conftructing of railways. See CANAL and RAILWAY.

MARKET *Bofworth*. See BOSWORTH.

MARKET *Deeping*. See DEEPING.

MARKET *Harborough*. See HARBOROUGH

MARKET *Hill*, a poft-town of the county of Armagh, Ireland. It is a thriving town, the neighbourhood of which may be confidered as claffical ground. Gosford caftle, the refidence of fir A. Acheron, the friend of Swift, (whofe defcendant is now lord Gosford,) adjoins the town, and near this is Draper's hill, a name given to a farm taken by the dean, on which he intended to build, and which was fo called that

"When none the *Draper's* praife fhall fing,
His figns aloft no longer fwing;
His famous letters made wafte paper,
This hill may keep the name of DRAPER;
In fpite of envy flourifh ftill,
And DRAPER's vie with COOPER's hill." Swift.

Market hill is 58 miles N. by W. from Dublin.

MARKET *Lavington*. See LAVINGTON, *Eaft*.

MARKET *Raifin*. See RAISIN.

MARKET *Weighton*. See WEIGHTON.

MARKHL, a town of Bavaria; feven miles N. of Burkhaufen.

MARKING-YARN, in fhips of war, is white yarn fpun the wrong way, and put into all cordage of three inches and upwards, as the king's work. Blankl. Nav. Expof. p. 103.

MARKLAND, JEREMIAH, in *Biography*, a learned critic, fon of the Rev. Ralph Markland, known as author of a work entitled "The Art of Shooting Flying," was born in 1693. He received his early education in Chrift's hofpital, from whence he was elected to Peter-houfe, Cambridge, of which, in due time, he became a fellow, and a tutor, but refufed to enter into holy orders. He lived much in retirement, and his courfe is diftinguifhed by few events. In the year 1743 he refided at Twyford, and in the following year he went to Uckfield in Suffex, where he refided till 1752, when he removed to a farm-houfe at Milton near Dorking, in which he lived till his death in 1776, when he had attained to the great age of eighty-three. He fhunned company, and was feldom feen beyond his garden. His circumftances were narrow, but his heart was liberal, and his hand at all times ready to afford affiftance to the needy, to the utmoft extent of his means. By efpoufing the caufe of an oppreffed widow with whom he lodged at Milton, he involved himfelf in an expenfive lawfuit, which reduced him almoft to indigence. His works are as follow: "Epiftola Critica," addreffed to bifhop Hare, and publifhed in 1723. In 1728 he publifhed an edition of the "Sylvæ" of Statius; and in 1740 "Notes on Maximus Tyrius," which are faid to have done great credit to his critical powers. He difplayed great fagacity likewife in his "Remarks on the Epiftles of Cicero to Brutus; with a differtation upon four orations afcribed to Cicero." In 1761 he publifhed an excellent grammatical tract "De Græcorum quinta declinatione imparifyllabica, et inde formata Latinorum tertia," which was annexed to an edition of the "Supplices Mulieres" of Euripides; publifhed in 1763, and reprinted in 1775. He affifted Dr. Taylor in his editions of Lyfias and Demofthenes; Dr. Mufgrave in his Hippolytus, and Mr. Bowyer in an edition of Sophocles, and alfo in his conjectures on the New Teftament, in which the paffages illuftrated by this critic are marked with an R. Gen. Biog.

MARKOV, in *Geography*, a fmall ifland of Ruffia, in the Frozen fea. N. lat. 71° 50′. E. long. 138° 14′.

MARKOVO, a town of Ruffia, in the government of Irkutfk; 56 miles S.W. of Kirenfk.

MARKOW, a town of Lithuania, in the palatinate of Wilna; 60 miles E.S E. of Wilna.

MARKOWISKA, a town of Poland, in Volhynia; 24 miles E. of Lucko.

MARKOWITZ, a town of Moravia, in the circle of Olmutz; 18 miles S. of Olmutz.

MARKS, LAKE OF, called also *Shibkah el Low-deah*, a large lake of Africa in Biledulgerid, reaching near 60 miles from E. to W. and about 18 miles broad, interspersed with several small islands, one of which, however, is large, and though uninhabited, well stocked with date trees. These trees are, by a fabulous tradition of the Arabs, ascribed to the stones of dates, which the Egyptians brought with them for sustenance, when they invaded this country; whence the circumjacent territory is denominated "Babyra Pharaoune," or the Plains of Pharoah. The situation of this lake, with regard to the sea, the Syrtes, and the river Triton, has induced some writers to take it for the "Palus Tritonis" of the ancients, and to consider the above-mentioned island as the Chersonesus of Diodorus Siculus and the Phla of Herodotus. Moreover, Pallas, who, with Libyan women, attended Sesostris in his Asiatic expedition, and who was supposed to have owed her origin to this lake, might have resided in this island. N. lat. 33° 50'. E. long. 8° 50'.

MARKT BIBART, a town of the duchy of Wurzburg; 24 miles S.W. of Bamberg.

MARKT *Hohenluhen*, a town of Saxony, in the county of Reuss; eight miles N.W. of Greitz.

MARKT *Offingen*, a town of Bavaria, in the principality of Oettingen Wallerstein; eight miles W.S.W. of Oettingen.

MARKT *Einersheim*, a town of Germany, in the lordship of Limburg; 16 miles E.S.E. of Wurzburg.

MARKTL, a town of Austria, on the Trasen; 12 miles S. of St. Polten.

MARKUTCHOE, a town of Bengal; 42 miles N.N.E. of Ramgur.

MARKUWKA, a town of Poland, in the palatinate of Braclaw; 36 miles S.E. of Braclaw.

MARKWOTIZ, a town of Bohemia, in the circle of Boleslaw; 12 miles E. of Jung Buntzel.

MARLBOROUGH, a market town and borough, consisting of two parishes, situated in the hundred of Selkey, and county of Wilts, England. Its name is supposed to be descriptive of its position; being seated at the foot of a chalk hill, the term marle having been anciently used to denote that earth, as well as the peculiar species of clay, to which it is now distinctively applied. The origin of this town is wholly involved in obscurity, for the opinion that it was the Roman station, Cunetio, is certainly erroneous. Whether it was known in the time of the Saxons is equally doubtful, as no vestiges of antiquity, calculated to induce such a belief, can at present be discovered; and Domesday-book mentions it in so slight and cursory a manner, that it is impossible to determine from that work any thing concerning its extent or condition. Probably, however, it was then merely a trifling village, and of course did not become of importance till some time after the Norman conquest; when a castle was built, some remains of which are still visible, near the inn originally erected by lord Hertford, and from its situation denominated "the castle." The great mount which appears in the gardens behind this house has been regarded by some as an immense tumulus or barrow, but that idea is successfully combated by Mr. King, who shews it to have been the foundation of the principal keep of the castle; such works being found to constitute part of the construction of all similar edifices, raised by the early Normans. In the reign of Richard I. this castle was of great strength, and was one of those seized by his brother John, (who afterwards ascended the English throne,) with the view of obtaining possession of the kingdom during that monarch's unfortunate captivity in Austria. Having failed, however, in his ambitious project, chiefly through the firmness of his mother, he was compelled to fly to the continent, leaving Marlborough castle to be defended by one of his adherents, but after the return of Richard, it was quickly reduced by Hubert, archbishop of Canterbury.

From this period to the year 1267, no transaction of moment seems to have taken place here. In that year, being the 52d of Henry III. a parliament was held in the castle, when a number of laws were enacted for the suppression of tumults, &c. and these acts are still known under the appellation of "the statutes of Marlbridge."

Marlborough was first incorporated by charter in the reign of king John, about the year 1204, but it also claims the privilege of having been a borough by prescription for a century previous to that era. Several other charters have been granted by succeeding monarchs confirming and extending the various rights and immunities of the corporation. The government of the town is confided to a mayor and two justices, assisted by a council, and an indeterminate number of burgesses. The mayor and justices are empowered to hold quarterly sessions of the peace. An annual court for the county is likewise held in the court room over the market place, where are also a council chamber and an assembly room. This edifice stands at the east end of the principal street, which runs from east to west, and constitutes the chief part of the town. The buildings are in general irregular, and present an appearance of great antiquity; some of them being constructed of wood, and having their fronts very curiously carved. Part of one side of this street is adorned with piazzas, which project from the houses forming an agreeable promenade for the inhabitants, and afford them shelter from the effects of rain. At the same end with the market house, or town hall, is the old church of St. Mary. The door way to the belfry is decorated with zigzag ornaments in the Saxon style. The tower is built of free-stone. A plot of ground near this church is supposed, by Dr. Stukeley, to have a strong resemblance to the scite of an ancient temple. A short way to the south stood an hospital, or priory, dedicated to St. John the Baptist, and said to have been founded by John Goodwin and William Ramsbeck. The meat market is placed about the middle of this principal street, and on the south side, at some little distance, is a private house, which formerly was part of a priory, belonging to some regular canons of St. Augustine, and conjectured by Gough to have been first erected in the reign of king John. St. Peter's church forms the chief ornament of the west division of the town. It has a lofty square tower surmounted with battlements and pinnacles: the roof is supported by light columns.

The manufactures carried on in this town are comparatively inconsiderable: indeed it may justly be regarded as deriving its main support from its advantageous situation on the high western road, and the consequent extent and superiority of its market, which is held on Saturday, and has been long celebrated for the excellence of its corn, butchers' meat, and cheese. The population, according to the parliamentary returns of 1801, was estimated at 2367 persons, who inhabited 464 houses.

To the south of Marlborough, at the distance of a mile, lies the extensive forest of Savernake, the property of the earl of Ailesbury. This forest contains a vast profusion of noble trees, some of which are exceedingly large and majestic: one, called by way of pre-eminence the *king ock*, overspreads an area of at least 60 yards in diameter. A

variety

variety of charming walks is difpofed in different directions, eight of which diverge like rays from a common centre, placed in a fpacious opening near the middle of the foreft. No natural fcenery can be imagined more picturefque or beautiful than that difplayed in various parts of this umbrageous diftrict, where the diverfity of hill and dale, wood and lawn, frequently prefents to the eye of the painter various interefting views.

In this foreft ftands a modern manfion, called Savernake-lodge, appropriated for the temporary refidence of lord Bruce, fon to the earl of Ailefbury; and immediately adjoining to its eaftern boundary is Tottenham-park, the feat of the noble owner himfelf. The houfe, a fquare building of brick, with two wings at each end, ftands on the fcite of the ancient palace of the duke of Somerfet, who fo much diftinguifhed himfelf in the caufe of the houfe of Stuart. In the ftate rooms are feveral very excellent pictures; and the library contains a very "curious horn, or elephant's tufk in the fhape of a horn," which is particularly defcribed in the third volume of the Archæologia. Oppofite to the north front of the houfe ftands a lofty column, one fide bearing an infcription in commemoration of the recovery of his majefty in 1789. The remains of Wolf-hall are the feat of fir John Seymour, whofe daughter lady Jane, unhappily for herfelf, attracted the notice of king Henry VIII., who put to death his former queen Ann Boleyn, and efpoufed this new favourite, who was deftined to fuffer the fate of her predeceffor. It is faid that the marriage was folemnized, and the fupper ferved up in a detached building, which is now ufed as a barn. The town of Great Bedwin, fituated in this neighbourhood, was diftinguifhed as the fcene of a battle between Wulfhere, king of Mercia, and Æfcuin, a Saxon nobleman, in the year 675. (See Bedwin, *Great.*) Littlecott-park, which lies on the fouth bank of the Kennet, about eight miles from Marlborough, would feem, more probably than that town, to have been the pofition of the Roman ftation, Cunetio. This fuggeftion is founded upon the fact, that this fpot agrees better with the relative fituation in which Cunetio is faid by Antoninus to have ftood, with regard to Verlucio (Heddington) and Spinis (Speen). It further derives fupport from the circumftance of a Roman teffellated pavement having been difcovered within the park which furrounds the houfe. Here, alfo, it is known that two Roman ways interfect each other at a point called Crofs-ford. The entrenchment named Chifbury-caftle, lies fomewhat more than two miles to the fouth-eaft of this interfection. On Martinfall-hill, at nearly the fame diftance fouth of Marlborough, is another extenfive fortification. Barbury-caftle is placed feveral miles to the north; and at Avebury are the remains of a very large and fingular Britifh ftructure, which has been already defcribed under that article. (See Avebury.) Britton's Beauties of Wiltfhire, vol. ii.

Marlborough, a townfhip of America, in Grenville county, Upper Canada, north of Oxford, watered by the Radeau.—Alfo, a diftrict on the Great Pedee river, South Carolina; 25 miles long and 19 broad.—Alfo, a poft-town, both ancient and wealthy, in Middlefex county, Maffachufetts, (the "Okommakamefit" of the Indians,) incorporated in 1660, and containing 1735 inhabitants; 28 miles W. of Bofton. A mode of manufacturing Spanifh brown, from a kind of earth or loam refembling bed ore, but not impregnated with particles of iron, has been lately difcovered in this town.—Alfo, a poft-town in Windham county, Vermont, containing, in 1790, 629 inhabitants.—Alfo, a poft-town in New Hampfhire, incorporated in 1776, and containing 1185 inhabitants; 26 miles from Afhburnham, in Maffachufetts.—Alfo, the name of three townfhips in Pennfylvania, the one in Marlborough county, and Eaft and Weft Marlborough in Chefter county.

Marlborough, *New*, a townfhip of Berkfhire county, Maffachufetts, on the Connecticut line, containing 1848 inhabitants; incorporated in 1759; 135 miles W. of Bofton.—Alfo, a townfhip in Ulfter county, New York, on the weft fide of Hudfon's river, north of Newburgh; containing 1848 inhabitants.

Marlborough, *Lower*, a town of Maryland, in Calvert county, on the eaft fide of Patuxent river; 24 miles S.E. of Wafhington; containing about 60 houfes. The river is navigable for fome miles above the town for fhips of burthen.

Marlborough, *Upper*, the chief town of Prince George's county, in Maryland, on the fouth-weft fide of Hatavifit, one of the two chief branches of Patuxent river, containing about 120 houfes; 47 miles S.S.W. of Baltimore.

MARLE, in *Mineralogy*, an intimate mixture of lime and clay, which having all the characters of a fimple foffil, is properly confidered as an object of oryctognofy. It is, by Werner and moft other mineralogifts, fubdivided into 1. Earthy, and 2. Indurated marle.

1. *Earthy marle; Erdiger mergel*, Wern.; *Mergel-erde*, Wiedenm. &c.; *Marne terreufe*, Broch.; *Mergel-lera*, aut. Suec.

Its colour is yellowifh-grey, paffing fometimes into ifabel yellow; alfo greyifh and yellowifh-white. On the whole it may be faid that its colours are lighter than thofe of the indurated marle. It is compofed of dull duft-like particles, either loofe or cohering, which foil a little, and are rather rough and meagre to the feel.

Spec. grav. 1.600—2.400, Kirwan.

It is found in Thuringia, near Eifleben, and Sangerfhaufen; alfo in Auftria, near Vienna; in Bohemia and Saltzburg; in Denmark, on Dronninggard, in Zealand, as alfo on Fühnen, in Jutland, &c.

It occurs as ftrata in fletz limeftone and in fandftone, fometimes immediately under the vegetable earth.

The earthy and the indurated marles pafs into each other; and the former is confidered by many mineralogifts as the product of decompofition of the latter: but the earthy kind is not always found accompanied with the indurated.

In Thuringia it is known under the name of the Afchengebirge.

2. *Indurated marle; Verhärteter mergel*, Wern.; *Argile calcarifère ou marne*, Haüy; *Steen-mergel*, Swed.

It is moftly fmoke-grey, blueifh and yellowifh-grey, and prefents in general all the colours of common compact limeftone. It occurs maffive, and fometimes, according to fome authors, alfo in fuppofititious cryftals of cubic and pyramidal forms.

Internally dull, fometimes glimmering, which is generally owing to admixed particles of fand or mica.

Fracture fometimes earthy, paffing into uneven and fplintery; fometimes flaty, particularly in thofe kinds that have but a fmall proportion of clay. Fragments indeterminately angular, blunt-edged, and fometimes laminar or flaty. It is generally without diftinct feparation, but alfo exhibits imperfectly cubic or columnar and globular concretions; which latter are fometimes compofed of concentric layers.

It is opaque, fometimes faintly tranflucent at the edges of thin fragments.

It is foft enough to yield to the nail; ftreak greyifh-white.

Not

Not particularly brittle; eafily frangible.

Spec. grav. 2.300—2.700, Kirwan.

The chemical and phyfical characters of marle (which, according as lime or clay preponderates, receives the name of calcareous or argillaceous marle) are the following: 1. When frefh it effervefces brifkly with all acids; but the argillaceous marle with greatly predominating clay, is often very little affected by acids. 2. After burning it ceafes to effervefce. 3. The argillaceous marle is apt to harden in the fire: the calcareous marle becomes more friable. 4. All kinds of marle are eafily vitrified. 5. When burnt they attract moifture and crumble. 6. They generally feel meagre, and the indurated kind are rough to the feel. When rather greafy to the touch, this property is caufed by very minute particles of mica. 7. In the bofom of the earth the marle is always rather moift, efpecially the argillaceous marle. 8. All forts of marle, when expofed to the air, crumble fooner or later in proportion to the degree of their folidity; indeed there are fome kinds that are not affected in this manner within the fpace of three or five years; but the generality are found to crumble, within a year or two, into a loofe earth ready for ufe.

The principal localities of indurated marle are; Saxony, Drefden, Wehrau, Meiffen, &c.; Auftria; Bilin, Luftritz, Meronitz, and feveral other places of Bohemia; Bavaria; Moravia; the Palatinate; Thuringia; Heffia; England; Italy; France; and other countries where the fletz-trapp and coal formations occur.

It is chiefly found fubordinate to fletz limeftone, in which it fometimes forms confiderable beds, alternating with compact limeftone; it alfo occurs in coal countries, fometimes in entire beds; and it conftitutes the cement of fome fandftones. The circumftances under which it occurs in the fletz-trapp formation, have not yet been afcertained. That in Bohemia it paffes into bafalt, as has been affirmed by Reufs, is doubted by other mineralogifts; but a tranfition of marle into limeftone on one fide, and into indurated clay on the other, is far from being a rare occurrence.

Indurated marle often contains iron pyrites, garnets (that of the Hiffelberg, at Meronitz, in Bohemia), copper azure, malachite (that of Thalitter), &c. Nor are petrifactions lefs frequently obferved in it, fuch as gryphitæ, belemnites, pectinites, chamites, ammonites, &c.; and fometimes alfo vegetable impreffions.

A remarkable and beautiful variety of indurated marle, which by fome writers is confidered as a kind of compact limeftone, is that known under the name of *Florence marble*, or *Ruin marble*, of which the following defcription is given by Brard. It prefents angular figures of a yellowifh-brown, on a bafe of a lighter tint, and which paffes, in diminifhing, to a whitifh-grey. Seen at a certain diftance, flabs of this ftone refemble drawings done in biftre. One is amufed to obferve in it kinds of ruins; there it is a Gothic caftle half deftroyed, here it prefents ruined walls; in another place old baftions; and what ftill adds to the illufion is, that in thefe forts of natural paintings there exifts a kind of aerial perfpective, which is very fenfibly perceived. The lower part, or what forms the firft plane, has a warm and bold tone; the fecond follows it, and weakens as it increafes its diftance; the third becomes ftill fainter, while the upper part, agreeing with the firft, prefents in the diftance a whitifh zone, which terminates the horizon, then blends itfelf more and more as it rifes, and at length reaches the top, where it fometimes forms, as it were, clouds. But approach clofe to it, all vanifhes immediately, and thofe pretended figures, which, at a diftance, feemed fo well drawn, are converted into irregular fpots, which prefent nothing to the eye. This play of nature is owing to ferruginous infiltrations in the fiffures of this marble, which otherwife is of dull fracture and very argillaceous; whence it is never ufed in architecture; they merely make flabs of it, which are framed like little pictures, and which are much efteemed in commerce when of certain dimenfions. It fometimes occurs that the fame flab is fawed in two, and the parts are fet together in the fame frame, fo as to appear but as one piece; and the drawings on the right and left bear a refemblance which ftill further helps the illufion. There are fome who, to outdo Nature, put painted figures at the bottom of thefe pictures; but this is an exuberance of the wonderful, which finifhes by fpoiling all.

Mr. Brard fhould have alfo mentioned the variety of the fame Florentine marble, which, inftead of the ruins, exhibits fine black dendritæ, arranged in fuch a manner as to reprefent, in the moft deceptive manner, groups of trees, fhrubs, &c. This is called *Landfcape marble.*

To this indurated marle muft alfo be referred the fine variety called *Cottam marble*, from being found at Cottam, near Briftol. It refembles, in many refpects, the laft mentioned variety of Florentine marble; its ground is afh-coloured or blueifh-grey, with blackifh-brown fpots and veins, moft of which have a dendritic form, reprefenting affemblages of fhrubs and trees, grottoes, &c. It is found in large oblong pieces.

The fingular balls, known by the name of *Ludus Helmontii*, belong likewife to indurated marle. They are of various fizes, from one inch to nearly one foot and a half in diameter, and generally difpofed in a regular manner in beds of marle. When broken in a direction parallel to one of the largeft furfaces, their interior exhibits a number of fiffures by which the whole mafs is divided into perfectly diftinct, and more or lefs regular prifms of from three to fix or more fides; the fiffures themfelves being fometimes empty, but oftener filled up with another fubftance, which is generally granular limeftone in a cryftalline ftate. There can be no doubt that the fingular conformation of the interior of thefe balls is the refult of a kind of contraction produced by exficcation; but it is difficult to account for the regularity of the fiffures, their not extending to the furface of the balls, and their being ftill filled with fubftances, which it would be moft natural to fuppofe injected from without. Thefe balls are found in almoft all countries where marle is not unfrequent. Thofe of Franconia and of Antwerpen are very regular in their internal ftructure; but the ifle of Sheppey, in the county of Kent, produces the largeft and fineft of them. They are alfo found of confiderable fize, and of a blueifh-grey colour, in Derbyfhire. Thofe of Durham are divided into fmall hexahedral columns of a very regular form and equal fize, while the narrow fiffures feparating the prifms from each other are filled with quartz. When the marle is difengaged from the quartzy fepta, thefe latter more or lefs reprefent the figure of a honey-comb.

The name of Ludus Helmontii is alfo given to thofe imitative figures, which folid pieces of indurated marle frequently affume; and which have received feveral other denominations, fuch as zingibritæ, or ginger ftones, priapolites, &c.

There are alfo geodes of marle, which generally owe their origin to the decompofition of a nucleus originally lodged in their centre; they are either empty or drufed over with cryftals moftly of calcareous fpar and quartz. They are found in Milan, and in various parts of France.

Ufe.—Some kinds of marle that contain but a fmall proportion

portion of lime have been employed in pottery; but the moſt important uſe of marle in general is in agriculture.

Marle, or *Marl*, in *Agriculture*, a ſoft, unctuous, heavy ſubſtance of the calcareous kind, found extenſively in ſome ſituations, at different depths under the ground. It is found in different forms in different places, and diſtinguiſhed, from its appearances, into *ſhell*, *clay*, and *ſtone* marle. The firſt is ſuppoſed to have had an animal origin, as being conſtituted of teſtaceous matters, in greater or leſs degrees of fineneſs, from the ſlow decompoſition and attrition which they have undergone for a ſucceſſion of ages, intermixed with a portion of earthy ſubſtances. This is generally found in ſuch places as have at ſome time been covered with water, conſequently are more or leſs pure, and contain greater or ſmaller proportions of the calcareous principle, according to the differences in the nature of the depoſitions of the muddy or other earthy matters, with which they are blended by the ſediments of ſuch waters. But in common they are found to contain a larger proportion than the ordinary kinds of lime.

In reſpect to the ſecond ſort, it has, in general, a large quantity of clay in union with the calcareous material; on which account, it has a greater power of abſorbing and retaining moiſture than moſt of the other ſorts. Marle of this nature varies greatly in regard to its colour, being found of a brown, blue, red, and yellowiſh appearance. And the third ſort is met with combined with ſand, in different proportions to the calcareous and clayey materials, upon which the difference in its hardneſs depends. But when it has a thin, flaky, or laminated ſtructure and appearance, it is termed *ſlate* marle. On account of the portion of clay that enters into the compoſition of theſe marles, they are capable of being ſoftened in a gradual manner, by the operation of water upon them, and at laſt to fall down into a powdery form. Dr. Ainſley long ſince remarked, that all marles contained ſome portion or other of clay, in combination with their calcareous matter; while in lime, it is generally ſand that is united with it.

It is ſtated, on the authority of Dr. Black, in the 21ſt volume of the "Annals of Agriculture," that "all marles effervefce or raiſe up frothy bubbles, when acids are applied to them; and as water alone frequently produces the ſame effects, when poured on dry clay, it may be neceſſary, in order to guard againſt miſtake, in making trials upon ſubſtances ſuſpected to be marles, to let them remain a little time in mixture with water, previous to their being ſubjected to the teſt of acids. The beſt or richeſt marles being ſuch as contain the largeſt proportion of calcareous earth, it frequently becomes a matter of importance to farmers to be able to aſcertain the quantities, (ſome being found ſo poor in this material as to have only a twentieth or thirtieth of their weight,) in order to decide on their advantage in preference to lime, chalk, or other ſubſtances to be brought from a diſtance. A ſimple and eaſy method, founded on the knowledge that this earth commonly contains about 40 *per cent.* of its weight of fixed air or carbonic acid, is propoſed by the profeſſor. It is merely by ſaturating the marle with muriatic, or ſome other acid, and marking correctly the loſs of weight which it ſuſtains by the extrication of the fixed air. Thus, if two hundred grains of marle be introduced into a veſſel with a little water, and muriatic acid poured upon them until the bubbles ceaſe to riſe, the loſs of weight being then found to amount to forty grains, the marle contains one hundred grains of calcareous earth. The proportion of calcareous earth contained in different marles may alſo be determined by diſſolving it by means of the muriatic acid, diluting the liquor with water, paſſing it through a filtering paper, and then precipitating the calcareous earth from the clear liquid by a ſolution of ſome fixed alkaline ſalt."

And the following ſimple methods have been ſuggeſted by Mr. Donaldſon, tending to ſhew that ſuch ſubſtances as are examined are marle; but they are not by any means ſo correct as the above.

Firſt, by Air.—"If a lump of true ſtone or clay marle be expoſed to the air, it will, in a ſhort time, break into ſmall pieces."

Secondly, by Fire.—"When a piece of real marle is dry, break it into as ſmall particles as poſſible, and put a handful into a hot coal-fire: it will crackle in the ſame manner as if ſalt had been thrown therein."

Thirdly, by Water.—"Put a piece of dried marle into a wine glaſs, and pour gently as much water thereon as will cover it: if true marle, it will gradually diſſolve into a liquid or ſoapy ſubſtance, and at the ſame time ſhoot up many ſparkles to the ſurface of the water." But "the moſt certain criterion, by which to prove marle of all kinds, is to put a little in a wine-glaſs, and pour over it a ſmall quantity of aquafortis, or ſome other ſtrong acid: if it effervefce, it is a ſufficient proof of its being marle; and the degree of the effervefcence, at the ſame time, aſcertains its quality."

It is obvious, however, that theſe ſimple, but imperfect, modes ſhould only be had recourſe to, when the means of a complete analyſis are not capable of being put in execution, for want of proper convenience.

Though there are the above differences in the natural appearances of marles, they agree in being all capable of being reduced into a fine powdery ſtate, by being expoſed for ſome time to the effects of the atmoſphere. By this means, they become ultimately capable of being blended minutely with the different materials of the ſoils upon which they are laid. But as this common property of falling down into powder, in conſequence of the abſorption of moiſture and carbonic acid or fixed air from the ſurrounding atmoſphere, is much greater in ſome ſorts of marle than others, it may afford ſome difference in their utility when applied to lands as manures. See Manure.

In the Farmer's Magazine, ſome moſs-ſhell marles are ſtated to have been found to contain 84 *per centum* of pure chalk, or carbonat of lime, which is more than lime generally poſſeſſes, the refuſe being chiefly peaty ſubſtances, which is a circumſtance, it is ſaid, that makes the refuſe of them the more uſeful as a manure, than that of limeſtone, which is moſtly ſand or clay. Theſe marles are alſo capable of being converted into quick-lime, by burning; and their ſolutions change vegetable colours to green, poſſeſſing all the other properties of cauſtic lime.

Marle is likewiſe further diſtinguiſhed by its feeling fat and unctuous; and its looking, when dry, after having been expoſed to the weather for ſome time, as if it was covered with a hoar-froſt, or ſprinkled with fine ſalt, and even when mixed with the land intended to be manured by it, the whole ſurface having a whitiſh appearance. The more marles effervefce with acids the more valuable they are as manures. In hot weather, good marle will ſlake with the heat of the ſun like lime; eſpecially when rain follows a hot day or two.

Good marles of different kinds abound in moſt parts of Lancaſhire, and are in very extenſive uſe in many places, having been found to anſwer well in different proportions and different kinds of land. See Marling *of Land.*

The

The farmers in Staffordſhire conſider the ſoft blue marle, which is commonly found under clay, or low black ground, at the depth of ſeven or eight feet, the beſt for arable land, and the grey ſort the beſt for paſtures. But that which is of a browniſh colour, with blue veins in it, and little lumps of chalk or limeſtone, generally lying under ſtiff clays, and very hard to dig, is moſt eſteemed in Cheſhire. The marle which is uſually found at the depth of about two feet, or a yard, on the ſides of hills, and in wet boggy grounds, which have a light ſand in their compoſition, is very fat and cloſe, and reckoned the ſtrongeſt; for which reaſon it is particularly uſeful on ſandy lands. It is often called peat-marle or delving-marle. What is ſometimes called paper-marle frequently lies near coals, and flakes like leaves or pieces of brown paper, being of a ſomewhat lighter colour. That which ſome call clay-marle is very fat, and ſometimes mixed with chalk-ſtones. There is another ſort of marle which breaks of itſelf into ſquare cubical bits. Theſe two laſt kinds generally lie under ſand or clay; ſometimes about a yard deep under the former, but often much deeper under the latter. The ſtone, ſlate, or flag marle, which is a kind of ſoft ſtone, or rather ſlate of a blueiſh colour, is generally allowed very good. It eaſily breaks down and diſſolves with froſt or rain, is found near rivers and on the ſides of hills, and is a very laſting ſort when uſed as manure.

In a variety of diſtricts of this kingdom marle diſcovers itſelf to the moſt negligent eye; particularly on the ſides of broken hills, or deep hollow roads. Many rivers are bordered with a vaſt treaſure of this ſort, which is plundered by every flood. Boggy lands frequently cover it; and in them it ſeldom lies above three feet deep. It is ſomewhat lower under ſtiff clays, and marſhy level grounds. The loweſt parts of moſt ſandy lands abound with it ſometimes at the depth of three feet, and ſometimes at ſeven, nine, or more. The depth of the marle itſelf can ſeldom be found; for when the upper cruſt of the earth is removed, all that can be ſeen or dug, is marle, to ſo great a depth, that there are few if any inſtances of a pit's having been exhauſted of it.

But the manner in which this earthy material is found, is probably different in different ſorts and ſituations.

In the Perthſhire Report, ſhell-marle is ſtated to be found for the moſt part in ſmall lakes, or in land-locked bogs and moſſes, where there had been formerly a lake or pond, during the multiplication of the animals. The wilks, which produce the marle, it is ſaid, live only one year, and multiply prodigiouſly. They are often found to adhere to the long graſs, which grows in pools, where they breed; and when the graſs decays, it is laid in horizontal lamina on the marle bed, by the weight of the animals. Theſe lamina aſcertain the number of years in which the marle bed has been forming, in the ſame manner as rings of trees denote their age. When the wilks happen to generate in ſprings or other ſmall collections of water, which are in moors or other high ground, they are frequently carried down in the wet ſeaſon, to the firſt ſtill water; but if the ſtream is not able to carry them to a pond, they are ſometimes left in the face of the hills, and form beds of marle in that ſituation. In Glentilt, a property belonging to the duke of Athol, there is, it is added, marle collected in this manner, on the declivity of a hill, to the depth of thirty feet, which, at a diſtance, has the appearance of a white rock. And according to ſome, not only wilks but bivalves produce ſhell marle. Theſe wilks are of a blackiſh colour, and about the ſize of a pea; and are found in rills or ſprings in the months of May and June, ſticking to ſtones and graſs. Wherever the wilks are obſerved in lakes, bogs, or meadows, it will be proper to bore for marle; or if they be found in ſpouty land, or in rills of water that flow into lakes or into marſhes that ſtagnate, it may alſo be proper to bore for marle in theſe lakes or ſtagnant water. Marle is found under moſt ſorts of ſubſtances, but more commonly under moſs, ſoft mud, and ſand; more rarely under clayey ſtrata.

Diſcovering of Marle.—This material is commonly ſought for and diſcovered by means of boring with a tool for the purpoſe, ſomewhat in the manner employed for coal and other ſimilar ſubſtances. A boring rod for this purpoſe is thus deſcribed in the Perthſhire Survey. "It is made of iron, in pieces of about four feet long, which ſcrew into each other. In the undermoſt or firſt piece is a kind of tube, about two and a half feet long, pointed ſharp, open on one ſide, and one of the edges raiſed higher than the other, like a gimblet; ſo that when turned round, it may fill itſelf with the ſubſtance which ſurrounds it. Into this tube, which is open at the top, is put a piece of wood, as long as the tube itſelf, and of a conical ſhape, correſponding exactly to its figure. To this piece of wood is faſtened a rope, of the ſize of one's little finger, and longer than the whole rod when all the pieces are put together. This piece of wood muſt ſtick ſo faſt as not to come out, when the rod is puſhed down into the earth or moſs, below which marle is expected to be found; but muſt not be ſo firmly faſtened, as not to be eaſily drawn out by the rope to which it is fixed." When it is wiſhed to bore, the piece of wood is put into the tube; ſcrewing "the piece of the rod which is fitted to the ſcrew on the top of the iron in which the tube is formed; then puſhing down the rod into the earth or moſs, allowing the rope to go down with the rod, without twiſting round it: and when the two firſt pieces of the rod are puſhed down their full length, ſcrew on the upper piece of the rod, which ought to fit the ſcrews of all the other pieces, and muſt have a hole in the top of it, large enough to admit of a piece of timber, two inches diameter and four feet long, with which you are to turn round the rod three or four times, having previouſly drawn up with the rope the piece of wood which had been put into the tube. When the tube is thus turned round, it will be filled with the ſubſtance next it; and when drawn up, will ſhew what that ſubſtance is. You can bore deeper and deeper, by ſcrewing on more pieces of the rod, below the piece into which the handle is received that turns it round; but for facility in unſcrewing, there ſhould be a hole in every piece of the rod, that will admit of a piece of iron, of the thickneſs of a man's thumb and eighteen inches long. It will be neceſſary to have two of theſe pieces of iron, ſo as to hold the rod ſteady with the one, while you ſcrew or unſcrew any of the pieces with the other; and this muſt always be done, in putting down and taking up, when a great length of the rod is required, as it cannot be managed in either of theſe caſes, all in one piece." See Boring *Augre*.

Marle is very common in Ireland, where it often lies not above a foot or two below the ſurface of the ſoil. But in France, though they have marle in many places, they are often obliged to dig very deep for it. In many diſtricts of this country there are alſo pits of this ſort of great depths. But where the marle lies at ſuch great depths, it can in very few caſes be raiſed for the purpoſes of manure. In moſt ſituations where it is employed in this intention, it is found only a few feet or yards below the ſurface, and it is uſually raiſed by digging pits, and where there is much water draining them either in the common way, or by the uſe of pumps. When they are not very deep, the beſt and moſt ready method for getting out the marle is to open a ſloping mouth, ſinking the pit gradually, wide enough for a cart to drive in and out; and to work the marle away circularly, keeping the pit ten or fifteen feet deep, by which means the expence of filling the carts will be much leſſened. And in caſes where it is raiſed from below loughs or ponds, it may ſometimes be neceſſary to have recourſe to boats for conveying it to their borders, in order to its being conveyed upon the lands.

In firſt opening the pits upon the land, it will be neceſſary that they be made as convenient as poſſible for carriage and draught, and that the leaſt poſſible injury be done by them to the grounds. Attention ſhould likewiſe be paid to the facility of laying them dry. When large pits are dug, maſſes of conſiderable ſize are often let down by undermining, and forcing large piles in above them. In theſe caſes great care ſhould be taken, as they are very apt to give way ſuddenly, and cauſe accidents.

Marle is a ſubſtance that may be made uſe of on moſt ſorts of ſoil, that are of a ſufficiently dry quality to admit of its being applied. It has been found highly uſeful on thoſe of the ſandy, gravelly, and moory kind; upon the more heavy ſorts it may likewiſe be found beneficial in many caſes, where the calcareous principles are wanting. This would at leaſt ſeem to be the caſe with ſhell-marle, which Dr. Robinſon ſays, of all others, abounds moſt in his diſtrict, containing more oil than any of the other kinds. In common with them, all he ſuppoſes pulverizes the ſoil, and prepares the vegetable food for being abſorbed by the roots of plants: in common with them alſo, it communicates to the ſoil the power of attracting the fertilizing influence of the air; but it ſurpaſſes them, by adding mucilaginous matter of its own to the ſoil, being the *exuviæ* of animals, and thereby increaſes in no ſmall degree the quantity of vegetable food. Moſt of the common marles, however, ſeem to act more in a mechanical manner upon the ſoils, than by adding any thing of a nutrient principle to them.

In digging for the marle they uſe in manuring their lands in Ireland, they meet with foſſile horns, and other curious foſſils. The marle always lies in the bottoms of low bogs. It is never met with in any other places, and is found by boring with augres made for that purpoſe. It uſually lies at five, ſeven, or nine feet depth. The obtaining it in many places is attended with very conſiderable expences, in draining off the water. The manner of digging it is this: they employ ſix able labourers, and a ſupernumerary; and theſe cut up a hole of twelve feet ſquare, which is ſuppoſed a pit that this number of men can manage in one day. Two men dig, two throw it up, and two throw it by, and the ſupernumerary man ſupplies defects on all occaſions. For the firſt three feet they dig through a furzy earth, fit for making of turf or fuel. Under this lies a ſtratum of gravel, of about half a foot. Under this often, for three feet more, there is a more kindly moſs, which would make better fuel. This lower ſtratum of turf is always full of foſſile wood, which is uſually ſo ſoft, that the ſpade cuts as eaſily through it, as through the earth it lies in. Under this, for about three inches, is found a ſeries of leaves, principally of the oak; theſe appear very fair to the eye, but fall to pieces on touching; and this ſtratum is ſometimes interrupted with vaſt heaps of ſeed, which ſeem to be broom or furze-ſeed. In ſome places there appear berries of different kinds; and in others, ſeveral pieces of ſea-plants, all lying in the ſame confuſed manner as the oak-leaves. Under this vegetable ſtratum there lies one of blue clay, half a foot thick, and uſually full of ſea-ſhells. This blue clay is not ſo tough as common clay, but is thrown carefully up, and uſed as marle in ſome places. Under this always appears the right marle; the ſtratum of this is uſually from two to four feet thick, and ſometimes much more. Phil. Tranſ. N 394, p. 122.

This marle looks like buried lime, and is full of ſhells, which are uſually of a ſmall ſize, and of the perriwinkle kind; but there are ſeveral other ſorts, at times, found among them. Among this marle, and often at the very bottom of it, are found great numbers of very large horns of the deer-kind, which are vulgarly called elks' horns. Theſe, where they join to the head, are thick and round; and at that joining there grows out a branch, which is about a foot long, and ſeems to have hung juſt over the creature's eyes; it grows ſtill round for about a foot above this, and then ſpreads broad, and terminates in branches, long and round, turning with a ſmall bend.

The labourers are obliged to work in a hurry in all theſe pits, ſo that they ſeldom bring them out whole. There are alſo at times found the leg-bones, and other parts of the ſkeletons of the ſame beaſts: but theſe are more rarely only a few together, and but in few places.

Marle, in *Gardening*, a ſort of foſſile earthy ſubſtance, which is ſometimes made uſe of for rendering ſtiff adheſive garden lands more open and light in their qualities.

This material varies much in its nature, ſome being nearly of the nature of fuller's-earth, and of a fat enriching quality, of which there are blue, grey, yellow, and red coloured; but the blue is eſteemed the beſt in this intention. In other caſes, it has the appearance of a kind of ſoft ſtone, or rather ſlate, of a blueiſh or grey colour, called ſtone or ſlate marle, being found commonly near river ſides, and the ſides of hills, &c. and though hard when dug, eaſily diſſolves by rain and froſt. There are likewiſe calcareous, or ſhell and clay marles, the latter reſembling a fat ſort of clay or loam. The laſt ſort is accounted good manure for improving light, looſe, ſandy, garden lands. See Manure, and Marle, in *Agriculture*.

Marle, in *Geography*, a town of France, in the department of the Aiſne, and chief place of a canton, in the diſtrict of Laon; 13 miles N.N.E. of Laon. The place contains 1616, and the canton 9967 inhabitants, on a territory of 257½ kiliometres, in 23 communes.

Marle *Dice*, in *Huſbandry*, a name given by the people of Staffordſhire to a reddiſh marle, that breaks into ſmall ſquare pieces like dice, or elſe into thin flakes, in the manner of lead-ore, and looks ſmooth on the ſurface. This is a good manure, and the way of judging which of it is beſt, is to expoſe it to the air in rainy weather, or to put it in water. That which moulders ſooneſt to powder in the air, and breaks quickeſt in the water, is ſure to be the beſt, and proves very beneficial to land.

Marle-*Slate, Bituminous;—Bituminous marlite*, Kirw.; *Bituminöſer mergel-ſchiefer*, Wern.; *Schiſte marno-bitumineux*, Broch.; *Koppar ſkifwer*, Swed.

Its colour is partly greyiſh, partly browniſh-black, and alſo of an intermediate colour; ſeldom blueiſh-black.

Occurs maſſive, and is frequently marked with impreſſions of fiſhes and marine plants.

Fracture ſlaty (ſometimes rather indiſtinctly ſo), partly ſtraight, partly undulated ſlaty.

The planes of ſeparation always ſhining; the planes of fracture of the ſtraight are ſlaty, rough, and generally dull, or at beſt, glimmering; thoſe of the curved ſlaty are ſmooth and gliſtening.

Fragments generally ſlaty.

Retains its colour in the ſtreak, which is gliſtening.

It is opaque; soft; rather mild; easily frangible.

In large flat pieces it is rather sonorous.

It is meagre to the feel; and moderately heavy.

Spec. grav. 2.361—2.442, Kirw.

It effervesces with acids. Before the blowpipe it first burns with a small flame, giving out a bituminous odour, and afterwards fuses into a black slag.

It is found at Eisleben, Sangershausen, &c. in Thuringia; at Riegelsdorf, in Hessia; in the county of Mansfeld; in Switzerland, at Aigle and Bex, &c.

The varieties rich in copper are often regularly wrought as ores of this metal: no other use is made of bituminous marle slate, which, when decomposing in the air, forms an earth injurious to vegetation.

Bituminous marle slate is subordinate to the fletz limestone formation, in which beds are sometimes formed by it. Its lowermost stratum, which rests on the old sandstone, is generally rich in copper ores, whence it has received the name of copper slate: these ores are copper pyrites, vitreous copper ore, variegated copper ore, more seldom copper azure, copper green, malachite, and still more rarely native copper. Besides these also some galena and carbonated iron is found in it; and its rifts are sometimes coated with selenite.

In this slate are frequently found the impressions and remains of fishes converted into coal, and which, by the convulsed and contorted attitudes in which they are seen, appear to indicate a sudden catastrophe, by which whole shoals of them perished. Nor is it less singular that impressions of the same species are generally found together. Of this description is, among others, the well known marle slate from Monte Bolca, of which, and the impressions contained in it, a detailed account has been given under the article ICHTHYOLITE. The quantity of fishes in the marle slate of Thuringia, is generally proportionate to the quantity of copper it contains; sometimes the whole of these remains is converted into copper pyrites. In the bituminous marle slate of Richelsdorf, in Hessia, Mr. Ries has discovered some remarkable impressions which he considers as produced by the bones of a child's hand; but, according to professor Blumenbach, the bones belonged to animals of another order of mammalia.

The bituminous marle slate passes into indurated marle; sometimes also into stinkstone.

MARLHEIM, in *Geography*, a town of France, in the department of the Lower Rhine; nine miles W. of Strasburg.

MARLHES, a town of France, in the department of the Rhone and Loire; 10 miles S. of St. Etienne.

MARLIEUX, a town of France, in the department of the Ain; 10 miles S.S.W of Bourg en Bresse.

MARLINE, on board a *Ship*, is a small line made of hemp untwisted, that it may be the more gentle and pliable: its use is to seize the ends of ropes from farcing out. They use it also to seize the straps at the arse (as they call it) or lower end of the block. See HOUSING.

MARLING, in *Sea Language*, denotes the art of winding any small line, as marline, spun-yarn, pack-thread, &c. about a rope, so that every turn is secured by a sort of knot, so as to remain fixed in case all the rest should be cut through by friction, &c.

Marline is commonly used to fasten slips of canvas, called parsling or parcelling, upon the surface of a rope, to prevent it from being galled by another rope that rubs against it, to attach the foot of a sail to its bolt-rope, &c.

MARLING *a Sail*, is when being so ript out of the bolt-rope, that it cannot be sowed in again, the sail is fastened by a marline, put through the eye-let holes, made in it for that purpose, under the bolt-rope.

MARLING-*Spike*, is an iron pin, tapered to a point, and furnished with a large round head. It is principally used to penetrate the twists or strands of a rope, in order to introduce the ends of some other through the intervals, in the art of knotting or splicing. It is also used as a lever on any other occasions, about the rigging, particularly in fixing the seizings upon the shrouds, blockstrops, clues of the sails, &c. Falconer.

MARLING *of Land*, in *Agriculture*, the operation of digging up and putting marle or some sort of material of this nature upon the ground, so as to effect its amelioration and improvement. In the application of all sorts of manures, the farmer must be regulated in a great measure by the quality of the soil, and the strength of the manure, in which experience is the surest guide. In marling, it is particularly necessary to find the true proportion which the land requires, and much better to err in laying on too little, than too much, as more may be added at pleasure; whereas by overdoing it, the first year's crop often fails, from the body of the marle not being sufficiently opened; and in that case, it will sometimes be three years before the ground comes to a proper state. The best directions that can be given the farmer in the application of this manure to light soils, is to lay on the quantity which will give the degree of cohesion wanted in those soils. A general rule cannot be laid down in this respect, as the quantity of marle requisite to effect the desired end must be different in proportion to the degree of lightness of the soil. But the quantities most commonly employed are from seventy to eighty loads. In Lancashire they have lately reduced the proportions of the sets, and found them to answer much better than the former larger ones. Upon lands of the sandy kinds, Mr. Young advises from fifty to sixty cubical yards *per* acre; but on those of the loose, wet, loamy sort, upon which this kind of manure produces great improvement, it should, it is suggested, be laid on to the amount of a hundred yards.

And in regard to the most economical method of doing this sort of work, it is, he imagines, that of contracting "for the whole job with some little farmer or horse keeper who works for hire." It is not uncommon in Suffolk to give 8*d.* a cubical yard for all expences whatever, except that of spreading, which those farmers that have attention to correct management do by the day, as it is of much importance to have it well performed; for where this is not the case, some parts of the field will have it in the proportion of two hundred loads, while others have not more than fifty. In the same county even 9*d.* and 10*d.* *per* yard, it is said, has lately been given to such small farmers for teams sufficiently strong for this sort of business.

The practice and success of Mr. Rodwell in this sort of work, as detailed in the second volume of Communications to the Board, hold out much encouragement.

On obtaining a lease of a farm, of 1400 acres, at 150*l.* a-year, of the poor, dry, heathy kind of land, abounding with fern, gorse, and more particularly ling, of little value, and affording only a scanty support to ill fed sheep; his "operations were to inclose with thorn hedges, marle, or clay, and break up 300 acres of the heath; and in the first seven years of the lease he finished what he meant to improve in that term; he marled or clayed 600 acres, at 70 loads an acre, being 42,000 large tumbril loads. In this work he employed three teams, two of his own, and one he hired, for several years. It is severe work, and the second year he lost nine horses, attributed to feeding on pea ſtraw from the new broken heath, a circumſtance that deſerves the attention of improvers. In the 11th year of his leaſe he applied to his landlord for a renewal; on which the farm was valued again, and he took a freſh leaſe of 15 years to commence at the termination of his old one, at the rent of 400*l*. He immediately clayed and broke up 200 acres more, at 100 loads an acre, 40 buſhels *per* load, incloſing all with quick hedges and ditches five feet wide and four deep; after this, he improved 300 acres more in the ſame manner. In the two leaſes of 28 years, he clayed or marled 820 acres; and he has clayed or marled ſo much over the ſecond time, at 70 loads an acre, that the quantity he has carried in all, is very little ſhort of 140,000 loads. Upon taking a third leaſe, he was, in 1798—9, particularly ſteady to this work, and in 49 weeks and three days carried 11,275 cubical yards, paying by meaſure of pits, and not by loads, which were filled and ſpread by four men and a boy, and carried by ſix horſes and two tumbrils."

And "in this buſineſs of carrying clay or marle he has practiſed hand-barrowing; the men can make good earnings at 10*d*. a yard, wheeling it 30 rod; and down to 7*d*. a yard at ſhorter diſtances; and he is much inclined to think, that if we had workmen uſed to the operation, and handy at it, like thoſe employed in navigations, that this method would be of all others the cheapeſt, eſpecially on the heavier ſoils. But by far the greateſt part he has done by tumbrils, the expence of which put out is 5*d*. a yard for team, and 2¼*d*. a yard for labour, and paying for laying picks, wedges, &c. alſo for ſtones that riſe, increaſe the whole expence to 8*d*. *per* yard, which is at leaſt 2½*d*. *per* yard cheaper than he can do it with his own teams: the reaſon of which is, that the man who contracts with him drives his own horſes, and looks after them; at 8½*d*. *per* yard, 140,000 yards have coſt him 4958*l*. excepting the ſmall proportion hired at ½*d*. *per* yard lower."

Here a few circumſtances are mentioned which he hopes may tend to render this communication uſeful to others, not having the experience which he has acquired. He ſays, he ſhall uſe but few words, but they ſhall be founded on poſitive experiment or attentive obſervation. Clay is much to be preferred to marle on theſe ſandy ſoils, ſome of which are looſe, poor, and even a black ſand. By clay is to be underſtood a grey clayey loam, ſome of it brick earth, and all has with vinegar a ſmall efferveſcence. Marle is a white, greaſy, chalky ſubſtance, that efferveſces ſtrongly with acids. He makes a univerſal rule, on a ſecond improvement, to lay clay on the fields marled before, ſometimes marle where clay was ſpread before; but this is not general, as clay anſwers beſt on the whole. On 90 acres, clayed 100 loads an acre, he has had after two crops, the one turnips, the other barley, cole-ſeed, and fold it on the ground for 1000 guineas; then turnips, a famous crop, followed by barley, on 75 acres, 16 coombs an acre; and by oats on 15 acres (poorer land), 10 coombs an acre. Theſe crops are for the ſoil *great;* but in general his products have been highly to his ſatisfaction.

It is ſtated by Mr. Young, that the expence of this ſort of work, where it is thrown from the mouths of ſloping pits into the carts, will be, "upon an average, three-pence to three-pence halfpenny *per* cubical yard, the filling and ſpreading, and about four-pence halfpenny for the teams, carts, and drivers; in all eight pence *per* load, or cubical yard, or 3*l*. 6*s*. 8*d*. *per* hundred loads; which will be a proper quantity for an acre of land: the benefit will laſt for twenty years, and the land always be the better for it."

It is ſufficiently obvious, that there muſt be conſiderable variations in the expence, from the circumſtances of conveying it from different diſtances, as is ſhewn in the Survey of Lancaſhire.

The expence of marling upon marſh land, near Liverpool, about the year 1780, is ſtated as follows:

Expences.	£	s.	d.
Getting and filling, *per* rod of 64 cubic yards	0	10	0
Spreading - - - - -	0	2	2
Carting, the average diſtance from the middle of the pit to the middle of the land, 60 rods	1	9	0
	2	1	2

In this eſtimate, there were ſix carts, five in motion, each going the diſtance of twelve rods, while one ſtood in the pit to be filled. The ſize of each cart was 20,736 inches (cubical), uſually drawn by three horſes; the weight of the load about 15 cwt. and two cubical yards of marle made about three loads. The number of workmen were ſix fillers and getters; uſually two right-handed men at one wheel, and two left-handed at the other, with one filler behind: one getter is generally ſufficient for the whole.

Expences.	£	s.	d.
Getting, filling, and ſpreading, to the acre of 64 yards to the rod, was - -	3	19	1
Cartage - - - -	9	8	0
Digging for the marle, clearing the head, expences at finiſhing, &c. *per* acre -	2	7	0
	15	14	1

There were about 6½ rods laid upon the acre on this occaſion. The men got 2*s*. 6*d*. and the carts 7*s*. 6*d*. *per* day. Getting and filling marle, it is ſaid, is very laborious work, and requires the utmoſt exertion to obtain theſe wages; and that this work, after all, can only be effected by young men in their prime, cheered by the company of fellow-labourers, and frequent refreſhments. Five working-days are reckoned equal to ſix at other work, for they uſually begin at half-paſt four in the morning, and reſt one hour at breakfaſt, from eight to nine; reſt again from twelve till two, and then work till ſix; and generally get out nine rods *per* week.

The preſent price (1795) is—	£	s.	d.
For getting and filling, *per* rod - -	0	12	0
Spreading - - - - -	0	2	6
Carting - - - - -	1	13	0
	2	7	6

Since this period the expences have been very greatly increaſed, ſo as to render marling a very heavy charge to the farmer.

In the Middleſex Report it is ſtated to be this: "Four men digging and filling eighty cart loads, at 4*s*. a ſcore, ſpreading included, is 16*s*. One man and four horſes, two days, at 12*s*.—1*l*. 4*s*. Total expence *per* acre, 2*l*.

An intelligent farmer, who has had conſiderable experience on a farm of twelve hundred acres, remarks, that, "from different trials of his own, at a very great expence, and the obſervations he has made on his neighbours' and the Norfolk farmers' manner of improving light ſandy lands, by clay and marle, he is clearly convinced, that about ſeventy ſquare yards, each of which contains about a cart load, is the propereſt quantity to be laid upon an acre of land, pole meaſure. If more be laid on, the longer it will be before it incorporate with the ſoil, and, of courſe, the longer before any benefit can be received from it. He once ſaw an inſtance, where a farmer laid 120 loads, or ſquare yards *per* acre, and gave this reaſon for it, that the land was ſo poor he was ſure he could not hurt it. But the conſequence of it was, that after an expence that would have purchaſed the fee ſimple of the land, he could not ſee, for many years, that he had done it any good, as it produced no better (if ſo good) crops, as land by the ſide of it that had not been clayed at all, but otherwiſe farmed the ſame. It has now, however, evidently the advantage of the other lands, having been done above twenty years. This trial was in the middle of a ſhiftable field, where, by the courſe of huſbandry, two crops are taken to one ſummer tilth; and where this is the caſe, claying, &c. ſeldom (or never he might ſay) anſwers the expence; for claying and marling being only a firſt, or beginning of improvement, by going on directly with a courſe of ploughing, which cannot well be avoided in ſhiftable fields, it is often buried and loſt before it mix properly with the ſoil, eſpecially if turned in too deep by the firſt earth, of which great care ſhould be taken. He would therefore recommend claying or marling only upon incloſed lands, unleſs where large breadths lie together, that can be farmed in any manner the occupier pleaſes; and in that caſe (as well as in incloſures) he would adviſe that the lands ſhould be laid down with clover, rye-graſs, and trefoil, the ſpring twelvemonth before laying on the clay or marle, and to remain at leaſt ſix months after it, that it may have time to ſink and eat itſelf into the flag before it is ploughed up, and then there will be little or no danger of loſing it, as it will already be in ſome meaſure incorporated with the ſoil." And, "no pains ſhould be ſpared to break all the lumps, and get it fine by repeated harrowings and rollings, and having all the ſtones picked and carried away, that the graſs may get through as ſoon as poſſible, for ſtock to be grazing upon it, which is the great and finiſhing improvement; for, as he obſerved above, claying or marling ſeldom or never anſwers where you go on immediately with a courſe of ploughing in the common way." Beſides, "in his opinion, as much, or more, depends on the management of lands after claying or marling, as in the mere laying it on, which, however, is very expenſive, and therefore a very perſuaſive argument in favour of that ſort of management that will be the moſt likely to make it laſting." But "little need be ſaid about the different quality of clay or marle, as every one muſt be content to uſe ſuch as is found on his own premiſes, for he never heard of any in the counties of Norfolk or Suffolk that would anſwer long carriage. He has ſeen, however, in the county of Kent, a ſort of marle that the Eſſex farmers buy, which, after being ſent many miles by water, he is informed they find anſwers carrying five or ſix miles by land. Clay that is freeſt from ſand, and marle that is ſoft and greaſy, are certainly, in his opinion, the moſt valuable; and even blue clay, that is condemned by moſt farmers, he has found to anſwer very well on light ſands, but they generally lie at too great a diſtance from each other to be prudently got together." However, "where there are different ſorts of manure equally convenient upon the ſame premiſes, which is ſometimes the caſe, *viz.* pure clay, white ſoapy clay marle, clay with much marle in it, loamy clay and cork; he ſhould certainly prefer the former for light ſandy lands; on ſands of a ſtronger nature, that have a mixture of loam with them, he ſhould chooſe the ſoapy-marle, or that mixed with clay-marle, whichever was moſt convenient; but any of the inferior ones muſt be uſed, rather than ſubmit to long carriage, eſpecially on a large ſcale."

With regard to the expences, "the firſt is the *filling*, which, including ſpreading, is 25*s.* a hundred, or $2\frac{1}{2}d.$ a load, with an allowance by ſome farmers of 2*s.* 6*d.*, by others of 5*s.* for opening the pit, and 1*s.* a load for all the large ſtones they throw out at the time of filling; the farmer to find drifts and ſtakes for letting down what they call the *falls*." And with reſpect to "the team, it muſt conſiſt of four ſtrong trace horſes, and two ſhaft horſes, which, for ſuch ſtrong work, muſt have very high keeping. He cannot, therefore, lay their labour at leſs than 2*s.* a day each, and the carter 1*s.* 6*d* a day, which, ſuppoſing they carry, one day with another (allowing for wet weather and hindrance by accidents, &c.), 30 loads a day, will be about $5\frac{1}{4}d.$ *per* load more, making in the whole $7\frac{3}{4}d.$ a load for filling, carting, and ſpreading." Therefore, taking the quantity of marle which is neceſſary on a medium, at 75 loads *per* acre, the ſtatement of the expences of this ſort of work will ſtand thus:

Expences.	£	s.	d.
Seventy-five loads, which, at $7\frac{1}{4}d.$ a load, is, *per* acre - - - - -	2	8	$5\frac{1}{4}$
Harrowing and rolling ſeveral times, to pulverize and ſpread it equally on the ſurface, *per* acre - - - -	0	1	6
Wear and tear of carts and harneſs, including accidents, at a farthing *per* load, *per* acre	0	1	$6\frac{1}{4}$
Loſs of ſeed, as it ſhould always be laid upon a layer, and be ſome months before it is ploughed in, *per* acre - - -	0	1	0
	2	12	$5\frac{1}{2}$

See Annals of Agriculture.

A late author ſtates, that "in Lancaſhire they have abundance both of ſtone and clay marle: the former is applied to the ſtrong clay ſoils, the latter to the light, loamy, and ſandy lands. The medium quantity laid on the acre is about three cubic roods, of eight yards to the rood. The expence in a great meaſure depends on the diſtance of carriage; but generally runs between ſix and ten pounds the acre. It is commonly laid on graſs lands, a year or two before they are broken up, although ſometimes on lands in a courſe of tillage. In either caſe, great care is taken to ſpread it as equally as poſſible on the ſurface, and to break any lumps on which the weather has not had ſufficient influence." And "the application of clay-marle to the light ſandy ſoils in Suffolk, has been the means of greatly improving thoſe ſoils; and the crops which they produce, after being marled, if the lands be not too ſeverely cropped, are ſo ſuperior, as fully to warrant the expence. The quantity laid on the acre is about eight loads, or nearly 2500 buſhels; this has been fully ſhewn above. And in the Iſle of Man, they lay on clay marle at the rate of nearly two hundred tons the acre."

But "it is to the county of Norfolk that we are to look for the wonderful effects produced by marle. Theſe are ſo great, that lands which, forty or fifty years ago, did not rent at eighteen pence the acre, now give upwards of twenty ſhillings. There are two kinds of marle in that county; the one of a white, or rather yellow colour, conſiſting almoſt entirely of calcareous earth; the other may properly be denominated clay marle, but from the ſmall quantity applied to the acre, it muſt be of a very rich quality, compared to to other marles; otherwife it could not operate fo powerfully on the foil. Of the firft, from ten to fourteen loads are fufficient for the acre; and of the laft, from thirty to forty. The mode of application varies. Sometimes it is ufed as a preparation for a crop of barley, or turnip; and is frequently laid on clover-ley, before being broken up for wheat; its ufe in this diftrict will be more fully feen below."

Yet it is fuggefted that, "if the above county has been benefited by the marles above-mentioned, that of Forfar, in Scotland, has reaped as great advantages from fhell-marle. Shell-marle, of a moft excellent quality, has been for a good many years difcovered in various parts of that county, and the improvements that have taken place, in confequence of the general and judicious ufe of that valuable manure, exceed perhaps any thing of the kind that ever happened in the fame period in any other county in the kingdom. The average quantity laid on the acre, is about four hundred cubic feet; and in refpect to the mode of application, it is in every refpect fimilar to that mentioned above, as the practice in Norfolk. Great caution is, he thinks, neceffary in ufing marle, and in adopting proper rotations of cropping after it is applied. If a large quantity be laid on at once, efpecially on light lands, or if the marle be laid on a fecond time in the courfe of a few years, and a number of fevere crops afterwards taken, the lands will be greatly exhaufted. This was experienced in many inftances, when marle was firft ufed as manure in Forfarfhire; the tenants, for the moft part, ignorant of the effects it would produce, laid on large quantities; which creating a great fertility, they went on fowing oats, and other fevere crops, till the foil became little better than a dead fubftance. This alarmed the proprietors, and induced them to include certain covenants in their leafes, fo as to prevent any prejudicial confequences in future. Thefe have been the means of eftablifhing a more regular fyftem of marling hufbandry in that county, than perhaps is to be found in any other part of the ifland. When a field is marled, the tenant is bound to lay it out in grafs, with the next or fucceeding crop, and allow it to remain three or four years in pafture. When broken up for corn, a certain fpecific number of crops only are to be taken, before it is again laid out to grafs; and fo on, during the currency of the leafe. The tenants are alfo debarred from laying on marle a fecond time on the fame field, in the courfe of one leafe, which is commonly for nineteen years, unlefs it be properly mixed with dung, or other fubftances. Thus the improper practice of overcropping the land after marling, and the no lefs injudicious cuftom of repeated marlings at fhort intervals, are both prevented; and under thefe reftrictions, which are in general very fteadily adhered to, marle is found in that diftrict a moft beneficial manure, and the lands continue in a progreffive ftate of improvement. Although it appears doubtful whether marle, unlefs laid on in large quantities, be advantageoufly applied to ftrong clays, yet it feems univerfally agreed, that for all light, dry, fandy, and gravelly foils, it is the beft manure yet difcovered. That being the cafe, every occupier of fuch lands ought to be extremely attentive in fearching for marle; and the proprietors and farmers in thofe diftricts where it has been lately difcovered, will effentially promote their own interefts, by bringing into general ufe a manure, which has been found in fo many other diftricts a fource of real wealth, and a means of fubftantial and extenfive improvement."

It is ftated in the furvey, that "this fubftance, in Strathern, in Perthfhire, is fold from eight to ten-pence the boll, being eight cubical feet. The ordinary allowance for an acre is from forty to fixty bolls. A gentleman on the Nairn eftate, betwixt Perth and Dunkeld, told the writer that the farmers in that diftrict go even the length of one hundred bolls to the acre: but moft of the land in that county is a deep ftrong loam. The moft experienced improvers allow forty bolls for a fecond marling, after an interval of fourteen years. The interval now adopted in the Stormont is nineteen years, efpecially on the eftate of Balharry and the country adjacent. On all light land its effects are powerful and immediate; but it requires to be managed with caution. Many places of the Stormont, and indeed in all Strathmore, have been almoft laid wafte by the exceffive application of this ftimulating manure and over-cropping the ground. At Braditton the foil loft all the power of cohefion, and became fo light by this caufe, that it has no fward; the furface and the foil were blown away with the winds, in the fame manner as duft is raifed from the roads; and dens were made in fome inftances to the depth of five or fix feet. About Bakie, along the road from Coupar to Meigle, and in many other places, the fame injury has been done to the foil, by the injudicious ufe of marle. He faw one field weft of Blairgowrie, which had been fo reduced, that after it had lain fourteen years or more in grafs, it had fcarcely gathered a decent fward. Mr. Smyth of Balharry, to whom he owes much of his information relative to that country, told him that the land of Fullarton had been marled every fecond year for a fucceffion of ten or twelve years, which at length put the ground from carrying oats, but not from barley; which management and effect ftill continued in 1795. This fact feems to indicate that oats will exhauft marled land more than barley; or that the dung given to the barley crop, corrects the exhaufting quality of the marle.

"But the marle difcovered in Strathern has been applied very fuccefsfully to the lands in that neighbourhood, for a long time, becaufe a fucceffion of fcourging crops is not allowed. No fuch confequences have followed as thefe in the Stormont. The expence of dragging it out of the loch amounts to three-pence the boll, and a ftratum of mofs, from nine to fixteen feet, muft be removed, before the bed of marle in one end of the lake can be wrought. Sir William Murray fhewed him a field of thin gravelly moor laid down with marle alone, every acre of which, by fuch a dreffing, was equal to the maintenance of four fheep. In fome parts of the fame moor which had not been ploughed at all, the heath was banifhed in three years by a top-dreffing of marle, and fucceeded by a fine clofe grafs."

However, in the trials of Mr. Chatterton, made on a farm that had been marled at fome very diftant unknown period before, and had, in confequence, been altered in its foil from a weak fandy gravel to a rich loamy gravel, to the depth of ten or twelve inches, or fuch a depth as had been moved by the plough; on difcovering a pond from which marle had been taken, the year after his entering upon the farm he began with the marle. The firft piece to which he applied it was that of fome old mowing ground, which was fituated high, and was near a fharp gravel; it had but a very dry poor fward, producing only a fmall proportion of ordinary hay. He covered five or fix acres with marle, laying about forty loads upon the acre, and after it was fpread, was extremely attentive to feize a proper opportunity to harrow it fmall or fine, as it is feldom in a fit ftate for that work except upon a change of weather. The firft year, the improvement did not make make much appearance, but in the year following it was aftonifhingly great, both in the quantity and quality of the hay, and continued fo as long as he remained upon the farm, which was about fix years, being greatly increafed in value. In the following year he applied the fame quantity *per* acre, to a few acres in the middle of a

field

field that was under the plough, which was ſpread and ploughed in; after which oats were ſown, and the crop upon the marled part was ſuperior in ſtrength and richneſs to the other part of the field: but it did not ſeem to have undergone ſo great a change as the portion of graſs land juſt noticed. It is probable that the reaſon might be, that the piece ſown with oats had never been marled before; while the other, from the ſtrength and firmneſs of the ſoil, ſeemed to have had marle laid upon it at ſome time, as the top ſoil was much more free from pebbles, though underneath there was a very ſtrong gravel. When the field was in the ſtate of graſs-ſeeds, after the oats, the colour of the graſs was obſerved to be the ſtrongeſt and richeſt in the place where the marle had been applied; but as the whole was paſtured together, the difference in the quantity of produce could not be aſcertained. It is added that ſeveral other fields were marled while in the ſtate of tillage, with about the ſame number of loads *per* acre, all of which anſwered very well under the plough, were feeded well with graſs, and became rich paſtures; but that where the land was the moſt gravelly and ſharp, the greateſt change was produced. Vide Communications to the Board of Agriculture, vol. iv.

And in the practice of Mr. Kiddle, as ſtated in the ſame work, a vaſt ſuperiority was found in the uſe of clay marle, in the proportion of ſixty loads to the acre, over that of the chalky kind, on land of the new broken-up heathy kind, both in the turnips and crops which ſucceeded them, being nearly better by one half; which ſtrongly ſhews the neceſſity of procuring, if poſſible, clay or marle of the clayey kind, for ſuch ſorts of ſoil, even if brought from ſome diſtance, as the land is by ſuch means doubled in value; but that if it cannot be procured, and that of the chalky deſcription preſents itſelf, it muſt at all events be employed, "as without a ſtaple manure ſuch land will never admit of being converted into tillage with any advantage to the cultivator; without clay or marle, land of ſuch quality acquires no firmneſs, and no turnips can be grown upon them, as in the early part of autumn they will be ſubject to the "angerberry," and after being infected with it, they never make any progreſs in their growth, or are of any uſe for the cattle, particularly thoſe that are in a forward ſtate."

Mr. Marſhall, in his Rural Economy of Norfolk, ſtates, that "marle has been ſo long in uſe in that diſtrict, that there are few farms without marle-pits upon, or near them; ſo that ſearching for marle is at preſent ſeldom requiſite, and the art of diſcovering it not much ſtudied. The herb colts-foot (*tuſſilago farfara*) abounding on the ſoil, is conſidered as an indication of a jam of marle being ſituated near the ſurface. But, whether this is, or is not, an infallible guide, time and accidents or intentional reſearches have not failed to diſcover beds of marle in almoſt every eſtate, and, in ſome places, on almoſt every farm, ſituated ſufficiently near the ſurface to be worked with advantage. Of the quality of marles, the farmers in this diſtrict are, in a great meaſure, uninformed. That which falls moſt readily, and 'gets to work' the ſooneſt, is in the beſt eſteem; but, in general, the quantity of 'uncallow' (namely, the coping, or covering of earth, which lies upon the head, or jam) is more attended to than the intrinſic value of the marle. The depth of uncallow is generally very unequal; perhaps on the ſame jam of marle it will vary from one or two to ſix or eight feet deep, the ſurface of the jam uſually riſing into inequalities, termed heads." And "the depth of the jam is equally uncertain; he has ſeen one worked twenty feet deep; but in general, he believes, ten or twelve feet may be reckoned a middling depth. The bottom of the jam being generally a white abſorbent ſand, no pump or artificial drain is requiſite to free a Norfolk marle-pit from water, which no ſooner touches the ſand than it vaniſhes, as through the grate of an open drain."

It is ſuggeſted that in this county, "in working a marle-pit, the top ſoil is thrown back for manure; the remainder of the uncallow thrown to the bottom of the pit, and levelled for the carts to ſtand upon. When the jam is low, the marle is thrown immediately from it into the carts; but if it be too high for this operation, piles are driven in a row a few feet from the face of the jam; and, as ſoon as a crack is formed, water is poured into it, more eſpecially when the marle is dry and ſtubborn; and by this means many loads are thrown down at once; either to the bottom of the pit, or on to a platform level with the body of the cart; into which the marle, in this caſe, is thrown with great eaſe. Taking up the bottom of the jam is the moſt difficult part of the operation; the marle being firſt to be caſt up on to the bottom of the pit, and afterwards to be thrown into the carts. But by thus bringing up the bottom, two valuable things are obtained; a drain for the water, and a moſt convenient receptacle for the next line of uncallow. The labour beſtowed on marle previous to its being put into the cart, whether it be incurred by throwing down, looſening by pecks, crows, &c. or fetching up the bottom, is termed 'caſting'—the act of throwing it into the cart being called 'filling.'—The price of caſting was then three-pence to ſixpence a load, according to the circumſtances of the pit (the uncallowing being generally done by the day); and the price for filling two-pence or two-pence halfpenny, according to the ſize of the loads carried. He has known three-pence a load given for filling and ſpreading large loads: the price of ſpreading, alone, is about one ſhilling an acre. The number of loads carried out in a day by one team, varies, of courſe, with the diſtance to be carried; when the pit happens to lie in or contiguous to the ground to be marled, thirty loads have been carried; but five and twenty is, he believes, conſidered as a good day's work." But theſe prices are nearly doubled at the preſent period.

The quantity ſet upon an acre here is "equally various; depending upon two things: upon the judgment of the perſon who marles, and upon whether the land has, or has not, been marled heretofore. It is known, from common experience, that land which has been recently marled, receives no apparent benefit from a ſecond dreſſing of the ſame manure; but it is equally well known that, after ſome length of time has elapſed, a repetition of marling will generally anſwer. It is a notion pretty generally adopted, that, in this caſe, the quantity ought to be greater than it was the firſt or preceding time: and it being formerly the practice to ſet on a great quantity at once, ſeldom, perhaps, leſs than forty loads an acre, this notion has, probably, deterred many perſons from doing that which would have been ſerviceable to themſelves and their country. But there is not, it is believed, any general rule known, reſpecting either time or quantity: he has had frequent opportunities of making obſervations on a farm which affords a ſtriking inſtance on this ſubject. Two or three different tenants had failed ſucceſſively on this farm; though by no means high rented. The greateſt part of it had within the memory of man been marled with not leſs, in all human probability, than forty loads an acre; and the tenants who failed deſpaired of reaping any benefit from a ſecond marling after ſo ſhort an interval of time; but this farm falling into the hands of a more judicious tenant, he has, by marling, (and by other good management) accumulated, in little more than twenty years, a farmer's fortune; during which time he marled upwards of one hundred acres; and has found, from long experience, that twenty-five loads an acre,

acre, notwithftanding the recent marling, a fufficient quantity. He does not mean to intimate that the fame management would every where produce the fame effect; but he will venture to fay, that no man having marle upon his premifes ought to neglect to try its effect, by accurate and repeated experiments, upon every piece of land in his poffeffion, without being led away by any received notion, or general rule. The quantity fet on, upon land which is not known to have been marled, or out of which the marle is worn, is, at prefent, lefs than formerly." But in the fouthern hundreds, to which marle is obliged to be fetched a great diftance, ten or twelve loads are confidered as a dreffing; fix or eight are frequently fet on; while in the more central and northern parts of the diftrict, where marle is common on almoft every farm, twenty or thirty loads an acre are generally allowed, and fometimes forty loads. "And when it is known, from experience, or taken for granted without proof, that land, either through a recent marling, or other caufe, is not improveable by marle alone, a fmall quantity is mixed up with dung; either by bottoming the farm-yard, or the muck-heaps, with it; or by mixing it layer for layer with the dung in the heaps. In either cafe, they are afterward turned up, and thereby mixed more intimately together. With this preparation, marle has been found to anfwer, where, in its natural ftate, it had no effect."

It is ftated, in regard to the neceffity of marling, that "the fymptom, or indication, of a piece of land requiring to be marled, is taken from the plants which prevail upon it. 'Buddle' (*chryfanthemum fegetum*, corn-marigold) is confidered as a certain intimation that the land it abounds upon requires to be marled. 'Smart-weed' (*polygonum Pennfylvanicum*, pale flowered perficari) is likewife an obfervable fymptom. It is, it is believed, an undoubted fact, that marle, in a manner, extirpates thefe plants from the foil; and that 'quicks' (*triticum repens*) are confiderably checked by it."

It may be noticed that in this work three-wheeled carts are of vaft utility, from their great eafe and convenience to the cattle or teams, that are made ufe of in performing it. See Manure.

MARLINS, in *Artillery*, tarred white fkains, or long wreaths or lines of untwifted hemp, dipped in pitch or tar, with which cables and other ropes are wrapped round to prevent their fretting and rubbing in the blocks or pullies through which they pafs. The fame ferve in artillery upon ropes ufed for rigging gins, ufually put up in fmall parcels, called *fkains*. See Marline.

MARLITE, Bituminous. See Marle-*Slate*, *Bituminous*.

MARLO, in *Geography*, a town of Mecklenburg, on the Trebel; four miles E. of Roftock. N. lat. 54° 12′. E. long. 12° 42′.

MARLOE, Christopher, in *Biography*, an early Englifh poet, was born in the reign of Edward VI. and educated at Cambridge. He appeared upon the ftage in the reigns of Elizabeth and James I., and was, like his contemporary Shakfpeare, both an actor and a writer of plays. He compofed feven tragedies, which were highly applauded, and which, according to Mr. Warton, manifeft traces of a juft conception, but they abound in tedious and uninterefting fcenes, or with fuch extravagances as proceeded from a want of judgment and the barbarous ideas of the times. He tranflated many claffical pieces, among which were fome of "Ovid's Elegies;" and the firft book of "Lucan's Pharfalia." He is the author of an elegant fonnet entitled the "Paffionate Shepherd to his Love," printed in Percy's reliques. Marloe poffeffed much fancy, and fometimes writes in a vein of pure poetry, with fmooth verfification. He is charged with irreligion and infidelity, and was licentious in his manners. His end was tragical; having quarrelled with a footman about a young woman of no reputation, he was ftabbed with his own fword, that he had drawn upon his rival. This was about the year 1593. Moreri.

MARLOW, Great, in *Geography*, a borough, market-town, and parifh in the hundred of Defborough, Buckinghamfhire, England, is fituated near the banks of the river Thames, 17 miles diftant from Aylefbury, and 31 from London. The manor, called in Domefday book Merlaw, belonged, previous to the Norman conqueft, to the earls of Mercia, but, being feized by king William, was given by him to his queen Matilda. Henry I. who inherited it from his mother, beftowed it on his natural fon Robert de Melhent, afterwards earl of Gloucefter, from whom it paffed with that title to the Clares and Defpencers, and from the latter, by female heirs, to the Beauchamps and Nevilles, earls of Warwick. It continued in the crown from the time of Richard III's marriage with Anne Neville, till queen Mary granted it to William lord Paget, in whofe family it remained more than a century. From the Pagets it paffed through feveral intermediate poffeffors to fir William Clayton, who purchafed it in the year 1736. It is now the property of his defcendant fir William Clayton, bart. who has a handfome feat, called Harleyford, at a fhort diftance from Marlow.

The town of Great Marlow has been fuppofed, from the denomination Chipping Marlow, which occurs in ancient records, to have been a market-town in the time of the Saxons. It now confifts of two principal ftreets, and three fmaller. The High ftreet is fpacious, on a gradual defcent, and contains many good houfes. The whole town has been recently much improved. Its profperity has been increafed by the department of the Royal Military college, which has been provifionally eftablifhed here. The college confifts of two departments refpectively appropriated to the fenior and junior claffes of pupils. The firft clafs is fettled at Wycomb, and is for the inftruction of officers in the duties of the general ftaff; the fecond, at Marlow, for thofe who, from early life, are intended for the military profeffion, and who, by thefe means, may be grounded in the fcience previous to their attaining the age that enables them to hold commiffions. The whole college will fhortly be removed to Blackwater, where extenfive and appropriate buildings are now erecting from defigns of John Sanders, efq. architect.

The church of Marlow, which is a fpacious and ancient ftructure, confifts of a body and two aifles, with a tranfept dividing it from the chancel. From the tower rifes a wooden fpire, erected in the year 1627. The nave is feparated from the chancel by a fcreen of chalk decorated with tracery. The altar is of oak, curioufly carved. The old bridge, which croffed the Thames at Marlow, is of very remote origin; among the patent rolls in the Tower are grants from Edward III. and two fucceeding monarchs, allowing the bailiffs to take toll of all goods and merchandize paffing over or under the bridge; the receipts to be expended in repairs. This ftructure becoming ruinous and unfafe, the prefent bridge was erected by private fubfcription in the year 1789. The principal charitable inftitutions in the town are two free-fchools, one for twenty-four boys, and the other for the fame number of girls, founded by fir William Borlafe about the year 1624; and alms-houfes for poor widows, endowed purfuant to a deed of truft from John Brinkhurft, efq. dated July 20th, 1608. The rents of the eftates appropriated to their fupport now amount to forty-two pounds yearly; which have enabled the truftees to add two perfons to the eftablifhment, bliſhment, which originally conſiſted of only four. Some faint traces of a corporation are diſcovered in the records concerning the town, but it does not appear that any charter for its government was ever obtained; the laſt mention of the mayor and burgeſſes occurs about the end of the fourteenth century. The firſt return for the borough was in the twenty-eighth year of Edward I. when Richard le Mouner and Richard le Veel were choſen as its repreſentatives in the parliament held at Lincoln. It continued to ſend members till the ſecond of Edward II. after which no returns were made for 314 years, till the twenty-firſt of James I., when, on a petition to the houſe of commons, the privilege was reſtored. The right of election is in the inhabitants paying ſcot and lot; the number of voters being about 200. A market is held on Saturdays, and two fairs annually. The population ſurvey in 1801 ſtated the pariſh to contain 643 houſes, occupied by 3236 perſons. At a ſhort diſtance from the town are the Temple mills, where extenſive works are carried on in copper and braſs.

About two miles eaſtward is the village of Little Marlow, which contains 128 houſes, and 728 inhabitants. A benedictine nunnery was founded here about the time of Henry II.; but ſcarcely any part of the conventual buildings is now ſtanding, the principal materials having been uſed in the conſtruction of a farm-houſe.

On the ſouth ſide of the Thames, nearly oppoſite to Great Marlow, is Biſham abbey, which appears to have been erected by William Montacute, earl of Saliſbury, in the year 1338, for canons of the order of St. Auguſtine. It is now the ſeat of N. Vanſittart, eſq. M. P. Lyſons's Magna Britannia, vol. i. 4to. Beauties of England, vol. i.

Marlow, a town of America, in Cheſhire county, North Hampſhire, containing 543 inhabitants.

MARLSHAND, an iſland of Sweden, near the W. coaſt, in the North ſea. N. lat. 57° 53′. E. long. 11° 29′.

MARLY, *Machine of*, in *Hydraulics*, is a very complex machine for raiſing water at Marly, about ten miles N.W. of Paris, the primum mobile whereof is an arm of the river Seine, which, by its ſtream, furniſhing a fall of water of three feet, turns fourteen large wheels, which work the handles, and theſe with piſtons raiſe the water into the pumps, and with other piſtons force it up in pipes againſt the aſcent of a hill to a reſervoir in a ſtone tower. The baſin of the tower, which receives the water raiſed from the river, is 610 fathoms diſtant from the river, and 500 feet higher than the lower end of the ſucking pipes of the lower engines of the machine. The baſin ſupplies an aqueduct of thirty-ſix arches; whence the water is ſeparated into different conduits which lead it to Marly, and formerly led it to Verſailles and Trianon. The number of pipes in this machine is 253; and the quantity of water raiſed by it amounts to 5258 tons in twenty-four hours, or near 220 tons *per* hour, or $3\frac{1}{2}$ tons *per* minute; but the London-bridge water-works, with four wheels only, raiſe 11,724 tons in twenty-four hours, which is almoſt twice and a quarter as much. Some of the largeſt of our fire or ſteam-engines uſed in England, will raiſe as much water as that of Marly to the ſame height, and not coſt above 10,000*l.*

This machine, which began to work in 1682, and is ſaid to have coſt above four millions of pounds ſterling, was made by one Rannequin, a common mechanic of Liege, and has a great many excellent contrivances; but yet does not raiſe all the water that it might have done, becauſe the maker did not know how to give the river Seine all the advantages of which it was capable. Hence appears the neceſſity of a mechanic's being well acquainted with mathematics; or that able mathematicians ſhould apply themſelves to mechanics more than they do, and not think it below them to direct workmen. See Deſagul. Exper. Philoſ. vol. ii. p. 442 to 449.

According to Dan. Bernouilli's computation, the effect of the machine of Marly is not more than $\frac{1}{16}$ of its abſolute force; that is, there is a loſs of $\frac{15}{16}$ of that force. Dan. Bernouil. Hydrodyn. p. 182.

MARLY-LA-MACHINE, in *Geography*, a town of France, in the department of the Seine and Oiſe, and chief place of a canton, in the diſtrict of Verſailles, ſituated near the Seine, and celebrated for its water-works; four miles N. of Verſailles. The place contains 1227, and the canton 12,397 inhabitants, on a territory of 90 kiliometres in 17 communes.

MARMAGNE, a town of France, in the department of the Cher; four miles W. of Bourges.

MARMALADE, a confection made of the juice or pulp of ſome fruit, as plums, apricots, quinces, boiled with ſugar to a conſiſtence.

The marmalade of quinces is the moſt frequent: it is ſub-aſtringent, and grateful to the ſtomach.

MARMANDA, in *Geography*, a town of France, and principal place of a diſtrict, in the department of the Lot and Garonne; ſituated on the Garonne. The place contains 5598, and the canton 14.385 inhabitants, on a territory of $172\frac{1}{2}$ kiliometres, in 15 communes. The trade of the town, which is conſiderable, conſiſts in corn, wine, and brandy. N. lat. 44° 30′. E. long. 0° 15′.

MARMARICA, in *Ancient Geography*, an extenſive country of Africa, bounded on the E. and W. by Egypt and Cyrenaica; on the S. by the Sahara, or deſerts of Libya interior, and on the N. by the Mediterranean. After paſſing the Glaucum Promontorium, Cape Deris, the port Leucaſpis, and other inconſiderable promontories and harbours, we come to Parætonium, called by Strabo Ammonia, a city of conſiderable note. Florus ſtyles this city and Peluſium the two horns of Egypt; whence it appears that he conſidered Marmarica as part of Egypt, and Parætonium as a fortreſs of great ſtrength. At ſome diſtance from Parætonium, towards the frontiers of Cyrenaica, ſtood Apis, a town ſo denominated from the Egyptian deity of that name. Triſerchis, Zagylis, and other places on the ſea-coaſts, enumerated by Ptolemy, are ſo inconſiderable as not to merit attention. The principal Libyan nations inhabiting this region were the Adyrmachidæ and Ammonii. Some authors ſeem to make the Marmaridæ a nation inhabiting a particular territory contiguous to the greater Catabathmus; but others incline to the opinion, that all the Libyans of Marmarica were comprehended under this appellation. Father Calmet thinks that Marmarica was firſt peopled by the deſcendants of Lehabim, the ſon of Mizraim, mentioned by Moſes. Herodotus aſſures us that there was a great affinity betwixt them and the Egyptians, in the moſt important points.

MARMARIUM, a town of Greece, in the iſland of Eubœa.

MARMARO-PROSERA, in *Natural Hiſtory*, is a ſpecies of ſtones forming continued ſtrata, bright and beautiful, of very lively colours, and of a conſtitution ſo fine, that they will take a good poliſh; in all which particulars they agree with the genus of marbles, but differ from them in that they are never calcareous, nor do they ferment with acids. To the ſame claſs belong the granites and the porphyries.

The marmaro-proſera are ſtones of a compact, uniform texture, like that of marbles; ſome of them are vitrifiable, others not and ſome are of ſuch hardneſs as to ſtrike fire with

with fteel. Of this kind is the bafaltes. Da Cofta's Hift. Foff p. 252, &c.

MARMARUOLO, in *Geography*, a town of Italy, in the department of the Mincio; eight miles N. of Mantua.

MARMARYGÆ, a word ufed by the old writers in medicine, to exprefs fparks of fire, or the appearance of fuch flafhing before the eyes in fome diforders.

MARMIGNAC, in *Geography*, a town of France, in the department of the Lot; nine miles S.W. of Gourdon.

MARMOL CARAVAJAL, LUIS DE, in *Biography*, born in the fixteenth century, at Granada, was taken prifoner by the Moors of Barbary, and carried to Morocco. Here he collected all the materials he could get for an account of the country, which, when he efcaped from the houfe of bondage, he publifhed under the title of "La Defcripcion General de Africa." The French tranflation of this work by M. D'Ablancourt is very highly efteemed. Gen. Biog.

MARMONTEL, JOHN-FRANCIS, a diftinguifhed French writer, was born in 1723. His father was in low circumftances, and obliged to exercife great frugality in bringing up his children. His early education prefented him with few literary advantages, but from his mother, whofe language and fentiments were much fuperior to her ftation, he derived much benefit with refpect to mental cultivation, by which he foon diftinguifhed himfelf among his contemporaries. Through her influence he was fent to the Jefuits' college of Mauriac, where, with the practice of ftrict economy, he was enabled to go through the ftudies of the place. At the age of fifteen his father placed him with a merchant at Clermont; but he had a mind ill adapted to trade, and took the firft opportunity of quitting it after his arrival, and hiring a garret, with a few livres that he took with him, wrote to his father that he felt a vocation for the ecclefiaftical profeffion. He was allowed to follow the bent of his inclination, and was admitted at once into the philofophical clafs in the college of Clermont. His wants were few, and thefe he readily fupplied by undertaking the office of inftructing others in their earlier ftudies. The death of an affectionate father, in the fecond year of this occupation, was a very fevere ftroke upon him, but his heart was adapted to the exigency, and he inftantly took upon himfelf the paternal charge with refpect to an almoft deftitute family. He engaged as teacher of philofophy in a feminary of the Bernardines, and his talents almoft immediately gave him a marked diftinction in the fociety of monks, and profpects of greater celebrity foon opened upon him. He wrote an ode as one of the competitors for the prize given by the academy of "Floral Games" at Touloufe. The award was given againft him, but being diffatisfied with the decifion he fent his performance to Voltaire, who returned it with many commendations, and at the fame time prefented him with a copy of his works. He regarded this teftimony of regard from fo great a man as much fuperior to the prize for which he had been ftriving, proceeded with ardour in his career of ftudies, and obtained the prizes of feveral fucceffive years. His fcholars rapidly increafed, and in the fame proportion his gains were augmented, which he applied to the fupport of the family chiefly dependant on his labours. He fent for one of his brothers to be educated at his own expence and under his own eye. About this period he formed a refolution to quit his ftudies that he had been purfuing to fit him for the ecclefiaftical profeffion, and by the advice of Voltaire he determined to try his fortune at Paris as a man of letters: he obtained as an introduction the patronage and protection of M. Orri, the comptroller-general of the finances. Scarcely, however, had he reached the great city, when he found that his friend had been difmiffed from the miniftry. He was now encouraged by Voltaire to write for the ftage; he made the attempt, but in this and other efforts of a different nature he was completely unfuccefsful, nor could with all the application of which he was mafter fave himfelf from a ftate of indigence, and he was glad to undertake the education of a youth to improve his circumftances. This gave him admiffion to a felect and agreeable fociety, and by putting him out of the reach of want his mind was free for any exertion. He accordingly fet about a tragedy, which he finifhed, under the title of "Denis le Tiran:" it was acted in 1748, and obtained very general applaufe. From this moment money and fame poured in upon him: he attracted general notice, "was feafted and complimented, and at once fell into the vortex of Parifian fafhion." He did not, however, neglect the art to which he was indebted for his reputation, and in 1749 he brought forward a fecond tragedy, entitled "Ariftomene." Voltaire fat with him in his box, and cordially joined in the applaufe which it received. His next piece was the tragedy of "Cleopatra," which was finifhed and acted in 1750: this was probably written in a hurry, and its fuccefs was very indifferent; and the "Heraclides" which foon followed abfolutely failed. This difappointment feemed to roufe him into action, and made him attentive to future fortune. He obtained the place of fecretary of the royal buildings by the influence of Madame Pompadour, and under her brother M. de Marigny. He immediately took apartments at Verfailles, and "here," fays he, "thank heaven terminate the errors and deviations of my youth." In his literary capacity he was connected with d'Alembert and Diderot, and was their coadjutor in the Encyclopédie. His fervices to perfons in power procured him a penfion upon the privileged work called the Mercure François." In this he publifhed his "Alcibiades," compofed at a fingle fitting, and which was received with fo much applaufe that he followed it with "Soliman II." the "Scruple," and others; this was the origin of the "Contes Moraux," which became fo popular throughout Europe. In 1758, he quitted his office at Verfailles, and went to Paris, where he became an affociate with all the men of letters and artifts in that capital. His happinefs was, however, foon interrupted, by refufing to give up the author of fome fevere verfes which he had imprudently repeated in company. They were accordingly attributed to him, and he was committed to the Baftile. His confinement was fhort, and his treatment in it was of the mildeft kind. After his liberation, he made a tour through the fouthern provinces of France, in which he paid a vifit to Voltaire, and then wrote his "Epitre aux Poëtes," for the prize offered by the French Academy, and obtained the object of his ambition. In 1763 he was admitted a member of that body. His next literary production, and that which has conferred the greateft celebrity on his name, was his "Belifaire." The liberal fentiments which he had put into his hero's mouth concerning religious toleration, and the unimportance of controverted theological tenets, excited the refentment of the Sorbonne, which proceeded to a cenfure of the whole work, but it could not ftop its career; very large impreffions were difperfed over France and all Europe. On the death of Duclos, in 1772, Marmontel was appointed, without any folicitation on his part, to fucceed him as hiftoriographer of France. He prepared himfelf to exercife the duties of his new office by collecting materials for the reign of Louis XV.; he alfo engaged in the compofition of the Supplement to the Encyclopédie. After he had attained to the age of fifty-four he married a young lady of eighteen,

eighteen, and it is faid that this union, fo very unfuitable in point of years, was the fource of much real felicity. About the fame period he publifhed another work, entitled "Les Incas, or the Deftruction of the Empire of Peru," which united hiftory and fiction, and which was evidently, like the Belifaire, for the purpofe of inculcating liberal principles and enlightened fentiments. In 1783 he was, on the death of d'Alembert, elected to the poft of perpetual fecretary of the French Academy, and from this period his compofitions were chiefly confined to eloges and other pieces read before the academy, as well in verfe as in profe. He alfo employed himfelf in a complete edition of his works, now become very voluminous. During the latter years of his life he had to witnefs the ftormy fcenes of the French revolution: his ideas of reformation went no farther than the conceffions offered by the crown in 1788, and he contemplated with horror thofe conftitutional changes which he faw meditated by the popular party. He was, neverthelefs, chofen a member of the electoral affembly: but foon loft the confidence of his conftituents, by oppofing an unlimited liberty of the prefs, and he gladly retired to his country-houfe to remain a fpectator rather than actor in the great revolutionary drama. In his retreat from the bufy and noify world, he employed himfelf in writing fome additional "Contes Moraux;" and a "Cours Elementaire" for the inftruction of young perfons, confifting of fhort treatifes on grammar, logic, metaphyfics, and morals. He alfo drew up memoirs of his own life, addreffed to his children. In 1797 he was brought forward again into public life, and chofen a reprefentative of the department of Eure, and was, in the national affembly, particularly charged with the defence of the Catholic religion. He pronounced before the legiflative body a difcourfe "On the free exercife of public worfhip," and he continued to difcharge the functions of his office, till the decifion which rendered null the elections of his department, with thofe of many others. He died, almoft in indigence, in December, 1799, in the feventy-feventh year of his age; leaving a widow and two young children without fupport. As an author, Marmontel is characterized as warm and eloquent on grave and elevated topics, eafy and lively on light ones, ingenious, inventive, and varied, full of good fenfe and animated with fentiment: he is almoft equally fuccefsful in his addreffes to the heart, the imagination, and the judgment. His "Contes Moraux" contain many fine ftories, delightfully told, and fcarcely has any work of the age been more popular: the morality of fome of them is very doubtful, and hence the title "Moral Tales," as tranflated in our language, is not in all cafes proper. They are fictitious narratives relative to life and manners, and in general they inculcate valuable and ufeful leffons. Since his death his own memoirs have appeared, and alfo "Memoirs of the Regency of the Duke of Orleans," printed from his manufcript, in 2 vols. 12mo.

Marmontel, after hearing the "Serva Padrona" of Pergolefi performed in 1751 at Paris, in Italian, and by Italians, was one of the firft converts to the mufic of Italy in France.

This natural, eafy, graceful, and pleafing intermezzio, which produced Rouffeau's famous "Lettre fur la Mufique Françoife," likewife opened the ears of Diderot and d'Alembert, the abbés Annauld and Morillet, Meffrs. Suard and Grimn, who ever after continued hoftile to the old ftyle of French mufic.

Gretry, returning from Italy in 1767, new fet, at Geneva, Favart's comic opera of "Ifabelle et Gertrude," which fucceeded fo well, that, on the young compofer's arrival at Paris, Marmontel furnifhed him with other mufical dramas: and they feem to have been conftantly attached to each other ever after.

When Piccini arrived at Paris in 1778, Marmontel inftantly became a Piccinift, and wrote a pamphlet "On the Revolutions of Mufic in France," which gave great offence to the Gluckifts.

We have often obferved, that the French talk and write on the fubject of mufic better than the Italians; but it is all declamation. There is no part of mufic, vocal or inftrumental, in which they are comparable to the Italians.

Marmontel's ideas about dramatic mufic are fcattered through the Encyclopédie, which M. Laborde has collected and drawn to a focus, in his "Effai fur la Mufique," publifhed in 1780; and in Marmontel's "Revolutions," we have his *profeffion de foi muficale*, drawn up by himfelf.

But of all the reformers of French mufic, and partizans of the Italian, Diderot and Marmontel were perhaps the only two that were in earneft, and who feem to fpeak from feeling, not from fyftem. "Woe to thofe," fays Marmontel, "whofe tafte and ideas furpafs their means of gratification! The partizans of Lulli and Rameau forgot their quarrels, and united in defending French mufic of every kind againft the Italian." Marmontel fought ftoutly for melody; for the fimple, elegant, and graceful melody of Italy. "Gluck," he fays, "not only gives lefs melody, but melody of a more vulgar and common kind, than Piccini, Sacchini, and Pergolefi."

The Greeks did not allow that any pain or grief fhould diftort and deform the features in any one of the arts. In finging, Haffe tried his moft difficult paffages in a mirror; and the dying gladiator, the Niobe, and the Laocoon, make no frightful faces. A pathetic and paffionate air in mufic is not to fcream or howl. No paffion fhould be expreffed in mufic, that is not foftened into pleafure by the found, by exquifite mufical tones and chords. "Melody without expreffion is of little effect: expreffion without melody is fomething, but not all we want. The union of melody and expreffion of the moft perfect kind is the problem to be folved; and the melodies of Piccini, Sacchini, and Paefiello, fung by a Pacchierotti or a Marchefi, is the folution. Vinci firft revealed the myftery, by his natural, graceful, and flowing melodies, undeformed by complication in the accompaniments. Gluck has certainly not invented a new *genre*. He has, indeed, improved that of Lulli and Rameau by more movement and fire; but he has injured the Italian recitative, by loading it with harmony."

All Marmontel has faid is true and reafonable; but he has not faid enough. The root of the evil,—the grand, and, we fear, the invincible impediment to the introducing Italian melody on the French ftage, is the *finging*. Gluck faid to the complainants of want of air, of graceful, paffionate, or fpirited melody in his operas, that "they had no fingers to perform them." If the French themfelves would allow this as an excufe for Gluck, and place his trivial airs to neceffity, we fhould honour their tafte and candour, and lament their privation of the delight which fine airs, well fung, afford true lovers and judges of mufic. But when we are told that thefe ballad airs are models for the reft of Europe, where good fingers can be found, we think it borders upon arrogance, very unbecoming a nation juft emerging from barbarifm in vocal mufic.

The ferious dramas, written for mufic by Quinault, have increafed in favour, as poetry, in fpite of Boileau's four cenfures, ever fince the death of the author. The airs, however, could not be fet to modern melody in their original ftate. And when Piccini arrived in France, and requefted to to be furnifhed with dramas to fet, in which the fongs were phrafed and polifhed like thofe in the operas of Metaftafio, the true models of lyric poetry, Marmontel, in order to preferve the admirable lyric tragedies of Quinault, modernized the airs, and retained all the original beauties of the dialogue. Encouraged to this undertaking by the moft enlightened men of letters, to whofe judgment he fubmitted his labours, he prepared for Italian mufic the poems of Amadis, Roland, Perfeus, Proferpine, Atys, Phaeton, Ifis, Thefeus, and Armide; and on being applied to by the directors of the opera to let Piccini have one of them to fet, he gave them their choice, which fell upon Roland, of which the fable was taken from the "Orlando Furiofo" of Ariofto. Piccini was unacquainted with the French language: it was therefore neceffary, in explaining the poem, to accompany him in his labour ftep by ftep; and Marmontel performed this tafk with as much zeal and folicitude as Quinault himfelf could have done. The Italian compofer, from thefe inftructions, became in a fhort time fo well acquainted with the accentuation and mufical expreffion of French words, that the moft fevere critics were unable to point out a fingle fault which he had committed againft the profody and genius of the language. "It is well known," fays M. Laborde, "how complete was the fuccefs of this undertaking: he amply fulfilled the wifh of Marmontel, and refolved the problem, whether the French language was capable of receiving Italian mufic." We ftill think it is not; as the mufic which Piccini and Sacchini have fet to French words is very inferior to that which they have fet to their own language.

The number of operas, ferious and comic, which Marmontel produced for the feveral theatres of France, between the years 1747 and 1778, is prodigious. Very early in his life he furnifhed Rameau with operas for the Academie Royale de Mufique; and befides his dramas that were fet by others, he was author of the words of almoft all the comic operas which were fet by Gretry, during his long and fuccefsful career.

MARMOR, Marble. See Marble.

MARMORA, in *Geography*, a river of European Turkey, which runs into the Strimon, 6 miles N.W. of Emboli, in the province of Macedonia.—Alfo, a town of European Turkey, in Macedonia; 34 miles E.N.E. of Saloniki.—Alfo, an ifland in the ftraits of Conftantinople, or fea of Marmora, about 12 leagues in circuit. It is lofty, mountainous, and tolerably fertile: it contains feveral towns or villages, rather populous; it has two harbours, which are by no means extenfive, fituated towards the fouth. Veffels furprifed by a northerly wind, fomewhat ftrong, repair hither for fhelter. The inhabitants have a few flocks of fheep: they cultivate the vine, the olive-tree, and cotton, and gather various fpecies of grain. Marmora formerly bore the names of Nevris, from νεβρος, the fawn of a doe; Elaphonnefus, from ελαφος, a ftag, and νησος, ifland; and Proconnefus, from πρoξ, προκος, fignifying a young ftag, and νησος, ifland. Thefe latter names were given to it from the number of ftags which were met with in it. But Olivier thinks that none exift there at this day, as the woods are deftroyed, and the mountains are almoft naked. This ifland has received its name Marmora from a white marble, a little veined with grey and blueifh, which is furnifhed by it in great quantities. Although the grain of this marble is not fine, nor its colours beautiful and mixed, the Greeks efteemed it formerly, and made frequent ufe of it: they diftinguifhed it by the name of "Cyzicus" marble, becaufe that peninfula afforded fome, probably, of the fame quality, or becaufe the town of the fame name ferved as an emporium for it. Fragments of it are found among the ruins of almoft all the ancient cities: pillars of it are feen in various places, and particularly in the mofques of Conftantinople. It is faid, that the ftately palace of Maufolus, at Halicarnaffus, was lined with this marble. At the prefent day, it is only wrought for the fepulchral ftones made ufe of by the Turks, the Armenians, and the Europeans: it is feldom employed in the conftruction of houfes. N. lat. 40° 30'. E. long. 27° 33'.

Marmora, *Sea of*, or *White Sea*, a gulf between the ftraits of Conftantinople and the ftraits of Gallipoli; about 90 miles from eaft to weft, and 33 from north to fouth. It takes its name from that of the ifland above mentioned.

Marmora, a town of Afiatic Turkey, in Natolia; 33 miles E. of Magnifa. N. lat. 38° 43'. E. long. 28°.

Marmora, *La*, a town of Naples, in Calabria Ultra; 16 miles W. of St. Severin.—Alfo, a town of France, in the department of the Stura; 19 miles W. of Coni.

MARMORICE, a town of Afiatic Turkey, on the fouth coaft of the province of Natolia. The town is fmall, but fituated in a bay with a narrow entrance, which is reprefented as one of the fineft harbours in the world. N. lat. 36° 52'. E. long. 28° 30'.

MARMOROIDÆ, in *Natural Hiftory*, are ftones, which in their nature, texture, appearance, and other properties, refemble marbles; and only differ from them, in that the bodies of this genus never form continued ftrata, but are only found in loofe independent maffes, lodged in ftrata of other fubftances. M. Da Cofta fubdivides thefe into marmoroidæ of a plain ftructure, and thofe which contain fhells, corals, and other extraneous bodies. Hift. Foffils, p. 241, &c.

MARMOSA, in *Zoology*. See Didelphis *Murina*.

MARMOSETS, in *Geography*, a harbour in the ifland of St. Domingo, lying between cape Rouge and Grand Port Berhagne.

MARMOT, Arctomys, in *Zoology*, a genus of Glires in the clafs of Mammalia: the characters of which are, that the animals of this genus have two cutting teeth in each jaw, five grinders above and four below, on each fide, and that they have collar bones. This genus is very properly feparated from that of *Mus* by Dr. Gmelin, in imitation of Mr. Pennant. Moft, if not all the fpecies, hybernate, or become torpid, during winter: they wander in queft of food, and for other purpofes, during the day, feeding on roots and grain: they are capable of climbing, and dig burrows in the earth for their habitation; their heads are generally round and convex, having either very fhort ears, or none; their bodies are thick, with fhort hairy tails; the fore-feet have each four toes, and a very fhort thumb, or fifth inner toe; and the hind-feet have each five toes. The cæcum, or blind gut, is generally very large.

The fpecies are as follows:

A. Marmota, Mus Marmota of Linnæus, Alpine or Mountain Moufe, Alpine Marmot of Pennant, and Marmotte of Buffon. It has fhort round ears; the upper parts of the body are dufky brown, and the lower parts reddifh. The body is thick and fhort; the head large and thick, flattened at the top; the nofe thick and blunt, often carried erect when the animal fits; the two bones of the lower jaw are moveable on each other; the cheeks are covered and furrounded with long hairs; the muzzle has feven rows of whifkers; above and below each eye is placed a black wart, on which are hairs; the legs are fhort; the tail is ftraight, and covered with long hairs; the tip of the tail is very dark brown,

brown, almoſt black; the body and head meaſure ſixteen inches, and weigh nine pounds; the tail is about ſix inches long. Theſe animals inhabit the higheſt ſummits of the Alps and Pyrenæan mountains, in dry places where are no trees; feed on inſects, roots, and vegetables; are fond of milk, which they take by lapping with a murmuring noiſe; and drink very little. The Alpine marmots live in ſocieties of from five to fourteen, baſk in the ſun, and place a centinel, which whiſtles on the approach of danger, when they retire into their holes; and if they cannot eſcape, defend themſelves boldly, and bite with great fury. They form burrows with numerous paſſages and entrances: at the end of September they reſort to their ſubterraneous chambers, which are well lined with moſs and dry graſs, and ſtopping the entrance with earth, they remain here in a torpid ſtate of hybernation till the month of March. If they chance to be dug up, and are brought into a warm atmoſphere, they gradually revive. They are able to walk on their hind feet, and ſit up on their haunches, carrying food to their mouths with their fore-feet. They are eaſily caught on plain ground, but with difficulty in their holes, as they dig deeper when in danger of being taken, except during their torpid ſtate in winter. At this time, many of them are caught for the ſake of their fleſh, which is tender and delicate; partly for their ſkins; and partly for their fat, which the inhabitants of the Alps eſteem to be medicinal: but they are chiefly taken by the Savoyards, with a view of expoſing them as ſhows through various parts of Europe. In a tame ſtate, they are very deſtructive to all kinds of proviſions, clothes, linen, or furniture; and can hardly be prevented, even in warm climates, from falling into a ſtate of torpidity in winter. They procreate in April or May; and the female, after ſix or ſeven weeks, produces, two, three, or four young ones.

A. Monax, Mus griſeus of Pallas, Glis fuſcus, Marmota Americana or American Marmot, Monax of Edwards and Buffon, and Maryland Marmot of Pennant, has ſhort rounded ears, blueiſh noſe and cheeks, body of a deep brown colour, and longiſh tail, which is very hairy. The eyes are black and prominent; the feet and legs are black, with long ſharp claws; the tail is half the length of the body. This animal is about the ſize of a rabbit, and feeds on vegetables: its fleſh is very good, reſembling that of a pig. It inhabits the warmer ſtates of North America, and the Bahamas. In America, it forms holes in the clefts of rocks, and under the roots of trees, in which it paſſes the winter in a torpid ſtate; but it is not certain that they hybernate in the Bahamas, where the climate is very mild.

A. Bobac. See Bobac.

A. Empetra of Pallas, Canadian Marmot, Quebec Marmot of Pennant, of a mixed grey colour on the upper parts of the body, the lower parts orange; with ſhort rounded ears, and a hairy tail. This animal inhabits Canada, Hudſon's Bay, and the other northern parts of America. It is rather larger than a rabbit, and the tail is about two inches and a half long. The cheeks are grey; the face duſky, and not black; on the back the hair is grey at the roots, black in the middle, and whitiſh at the tips; the belly and legs are of an orange colour; the tail is ſhort, buſhy, and of a duſky colour; the feet are black and naked, with four long, ſlender, divided toes, and the rudiments of a thumb on each fore-foot, and five ſimilar on each behind, all armed with pretty ſtrong claws.

A. Pruinosa, Hoary Marmot, with very coarſe, long, hoary fur, whitiſh cheeks, a black noſe, and black legs; having ſhort oval ears. Inhabits the northern parts of America; is about the ſize of a rabbit; with noſe black at the tip; the tail is black, mixed with ruſt colour; with four toes on each fore-foot, and five behind, all armed with duſky claws.

A. Suslica, Souſlik of Buffon, Caſan Marmot of Pennant, has the upper parts of the body of a yellowiſh-brown colour interſperſed with numerous ſmall white ſpots, very ſhort ears, hairy tail about the length of the thighs. Inhabits Caſan as far as Auſtria, dwells in the deſert, digging holes in the black ſoil of the declivities of the mountains; which burrows are ſeven or eight feet long, winding, with ſeveral entries, having at the bottom ſeveral apartments, ſtored with corn, peas, linſeed, hempſeed, and other grains and ſeeds, in ſeparate cells, and ſeparate holes in which they live. This animal is about the ſize of a large rat: the tail is covered with ſhort yellowiſh-brown hair; the fore-feet have four toes, armed with long claws, and a ſhort thumb, or rudiment of a fifth toe; the hind-feet have five toes each, the two outer ones ſhort, and the other three long.

A. Citillus, Ziſel of Buffon, earleſs Marmot of Pennant, is of an uniform dark cinereous grey colour, has no external ears, a blunt noſe, a long ſlender body, and a very ſhort tail; inhabits Hungary, Auſtria, and Poland; burrows like the former, and is rather larger, being nearly a foot in length.

A. Zemni, Zemni of Buffon, Podolian Marmot of Pennant, Zits-jan of Le Brun, and little Earth-dog of Rzaczinſki, is of a mouſe-grey colour, has ſhort rounded ears, five toes on all the feet, and very minute eyes concealed beneath the fur. Inhabits Ruſſia and Poland; is larger, ſtronger, and more miſchievous than the former. Its body is ſlender, covered with ſhort, ſoft fur; the tail of a moderate ſize; the fore-teeth very large, projecting much from the mouth, the under ones being much longer than the upper; the feet are all divided into five toes, armed with crooked claws; about the ſize of a ſquirrel, and in diſpoſition and manners reſembling the Ziſel. It bites cruelly, and feeds voraciouſly on grains, fruits, and pot-herbs, laying up magazines of proviſions in its burrows, where it paſſes the winter. Gmelin includes the three laſt deſcribed animals under one deſcription, ſuppoſing them to be of the ſame ſpecies; but they are ſeparated by Buffon and Pennant. This ſpecies is repreſented as inhabiting the ſouthern parts of Ruſſia, as far as Kamtſchatka, and the iſlands between Aſia and America, in Perſia and China, but rarely found in the reſt of Europe. The male is eaſily tamed, but the female is fiercer; goes with young between three or four weeks, and brings forth from three to eight young ones about the beginning of May. The fur is very good in the ſpring, and the fleſh is reckoned tolerable These animals are preyed on by polecats, weaſels, hawks, carrion-crows, and cranes. They vary conſiderably both in ſize and colour. Gmelin ſuggeſts that this animal may be the ſame with the "Mus Ponticus" of Ariſtotle and Pliny.

A. Gundi, Gundi of Pennant, is of a brick-duſt red colour, with wide open ears, which appear as if cropt, or cut off. Inhabits Barbary, near Maſſuſin, towards mount Atlas. Its ſize is about that of a ſmall rabbit; the tail is ſhort; the upper fore-teeth are large and truncated, the lower ones ſlender and pointed; it has four toes, armed with claws, on all the feet, and uſes the ſole in walking as far as the heel.

A. Hudsonia, Hudſon's Marmot, tailleſs Marmot of Pennant; is of a brown-aſh colour, with ſhort external ears and no tail. Inhabits Hudſon's Bay. It has two cutting teeth above, and four in the lower jaw; the hairs are tipt with white.

A. Maulina, Chileſe Marmot, is of a reddiſh-brown colour, with ſharp ears, having five toes on all the feet.

Inhabits the woods of the province of Maule, in Chili. This animal agrees with the common marmot in the colour and length of the hair, but is nearly twice as large; the fnout is long-fhaped, having four rows of whifkers; the feet have all five claws; and the tail is furnifhed rather thinly with hair.

Marmot, *German.* See Mus *Cricetus.*

Marmot, *Lapland.* See Mus *Lemmus.*

MARMOTA. See Marmot, *fupra.*

MARMOTTE Volant. See Vespertilio *Nigrita.*

Marmotte. See Hyrax *Capenfis.*

MARMOUTIER, in *Geography*, a town of France, in the department of the Lower Rhine, and chief place of a canton, in the diftrict of Saverne; three miles S. of Saverne. The place contains 1990, and the canton 10,395 inhabitants, on a territory of 105 kiliometres, in 25 communes.

MARNAY le Bourg, a town of France, in the department of the Upper Saône; 11 miles W. of Befançon.

MARNE, a river of France, which rifes in the department of the Upper Marne, about three miles to the E. of Langres, and after purfuing a courfe by feveral towns, joins the Seine at Charenton.

Marne, a town of Perfia, in the province of Khorafan; 210 miles N. of Herat.

Marne, one of the ten departments of the N.E. region of France, compofed of Remois and Perthois, with a part of Brie, bounded on the N. by the departments of the Aifne and Ardennes, on the E. by the department of the Meufe, on the S. by that of the Aube, on the S.W. by that of the Upper Marne, and on the W. by the departments of the Seine and Marne; about 33 French leagues in length and 30 in breadth; in N. lat. 49°. Its territorial extent is 8480 kiliometres, or 405 fquare leagues, and it contains 310,493, or, according to Haffenfratz, 348,885 inhabitants. It is divided into five circles, 32 cantons, and 499 communes. The circles are Reims, including 105,472 inhabitants; St. Menehould, 30,840; Vitry-fur-Marne, 49,706; Chalons-fur-Marne, 37,062; and Epernay, 87,413. Its capital is Chalons-fur-Marne. Its contributions amount to 4,115,188 fr. and its expences for adminiftration, juftice, and public inftruction, amounted in the 11th year of the French era to 320,103 fr. 33 cents. The foil of this department is indifferently fertile in grain, and yields good wine and paftures. There are fome forefts near the extremities of the department.

Marne, *Upper*, one of the ten departments of the N.E. region of France, formerly Vallage and Baffigny, bounded on the N.W. by the department of the Marne, on the N.E. by the departments of the Meufe and the Vofges, on the S.W. by the department of the Upper Saône, on the S. and S.W. by the Côte d'Or, and on the W. by that of the Aube; 29 French leagues in length and 19 in breadth; containing in territorial extent 6540 kiliometres, or 315 fquare leagues, and 225,350, or, according to Haffenfratz, 225,010 inhabitants. It is divided into three circles, 28 cantons, and 552 communes. The circles are Waffy, including 60,392 inhabitants, Chaumont, 75,134, and Langres, 89,824. Its capital is Chaumont. Its contributions in the 11th year of the French era, amounted to 2,315,762 fr., and its expences to 209,023 fr. 33 cents. In this department are many pleafant vallies, which yield grain, wine, and good paftures. The wooded hills contain iron mines and mineral fprings.

MARO, or Marro, a town of the principality of Oneglia; 9 miles N.W. of Oneglia.—Alfo, a town of Pegu, fituated on an ifland formed by the mouths of the Ava; 120 miles S.S.W. of Pegu.—Alfo, a mountain of Portugal, in the province of Alentejo; 6 miles N.W. of Evora.

MAROBUDUM, in *Ancient Geography*, a town of Germany, which belonged to the Marcomani. Ptolemy.

MAROELAT, in *Geography*, a town on the N. coaft of the ifland of Bouro. S. lat. 3° 10′. E. long. 127° 7′.

MAROGGIO, a town of Naples, in the province of Otranto; 17 miles S.E. of Tarento.

MAROGLIO, a river of Sicily, which runs into the fea, near Terra Nuovo, in the valley of Noto.

MAROGNA, a town of European Turkey, in Romania, near the Archipelago; 64 miles E. of Emboli.

MAROLLES, Michael, in *Biography*, fon of Claude de Marolles, famous as a champion of the league, in defence of which he killed Marivaut, the royalift champion, in fingle combat. The fon had an extraordinary paffion for ftudy, and at the age of nineteen publifhed a tranflation of Lucan. He was too eager in the purfuit of fame as an author, to attend much to elevation in the church. He applied himfelf chiefly to tranflation, and gave verfions of Plautus, Terence, Lucretius, Catullus, Tibullus, Virgil, Horace, Juvenal, Perfius, Martial, Statius, and the Auguftan hiftorians, Ammianus, Athenæus, &c. He began a tranflation of the bible; and he compofed his own "Memoirs," which contain a vaft number of anecdotes. An edition of them was publifhed by the abbé Goujet, in three vols. 12mo. His laft work was a "Hiftory of the Counts of Anjou," publifhed in 4to. in 1681, the year in which he died at the age of eighty-one. Marolles was one of the firft who collected prints: his collection amounted to 10,000, and his catalogues of them are much valued by the curious in that walk. Moreri.

Marolles, in *Geography*, a town of France, in the department of the Aube; 6 miles N. of Bar.—Alfo, a town of France, in the department of the North; 6 miles W. of Avefnes.—Alfo, a town of France, in the department of the Loir and Cher; 6 miles N. of Blois.

Marolles-*les-Braux*, a town of France, in the department of the Sarthe, and chief place of a canton, in the diftrict of Mamers; 7 miles S. of Mamers. The place contains 1808, and the canton 13,993 inhabitants, on a territory of 160 kiliometres, in 18 communes.

MAROMMES, a town of France, in the department of the Lower Seine, and chief place of a canton, in the diftrict of Rouen. The place contains 1455, and the canton 14,760 inhabitants, on a territory of 142½ kiliometres, in 19 communes.

MARONEA, Marogna, in *Ancient Geography*, a town of Ciconia, in Thrace, near the lake Ifmaris; it is mentioned as the place of the retreat of the 10,000. Mela places this town on the bank of the Neftus; but Steph. Byz. erroneoufly near the Cherfonefus. M. d'Anville properly fixes its fituation on the coaft N.W. of Stryma. According to Pliny it had formerly been denominated Ortagurea. As its territory produced excellent wine, it was regarded as being under the protection of Bacchus; and according to traditionary report, this wine had the perfume of nectar.

MARONI, in *Geography*, a river of Guiana, which runs into the Atlantic, N. lat. 5° 52′. W. long. 55° 14′.

MARONIA, in *Ancient Geography*, a town of Syria, placed by Ptolemy in Chalcidia, between Tolmideffa and Coara.

MARONITES, in *Ecclefiaftical Hiftory*, a fect of eaftern Chriftians, who follow the Syrian rite, and are fubject to the pope; their principal habitation being on mount Libanus, or between the Anfarians to the north and the Druzes to the fouth.

Mofheim informs us, that the doctrine of the Monothelites, condemned and exploded by the council of Conftantinople,

nople, found a place of refuge among the *Mardaites*, fignifying in Syriac rebels, a people who took poffeffion of Lebanon, A. D. 676, which became the afylum of vagabonds, flaves, and all forts of rabble (fee MELKITES); and about the conclufion of the feventh century they were called Maronites, after *Maro*, their firft bifhop; a name which they ftill retain. None, he fays, of the ancient writers, give any certain account of the firft perfon who inftructed thefe mountaineers in the doctrine of the Monothelites: it is probable, however, from feveral circumftances, that it was John Maro, whofe name they had adopted; and that this ecclefiaftic received the name of Maro, from his having lived in the character of a monk, in the famous convent of St. Maro, upon the borders of the Orontes, before his fettlement among the Mardaites of mount Libanus. One thing is certain, from the teftimony of Tyrius, and other unexceptionable witneffes, as alfo from the moft authentic records, *viz.* that the Maronites retained the opinions of the Monothelites until the twelfth century, when abandoning and renouncing the doctrine of one will in Chrift, they were re-admitted to the communion of the Roman church. The moft learned of the modern Maronites have left no method unemployed to defend their church againft this accufation; they have laboured to prove, by a variety of teftimonies, that their anceftors always perfevered in the Catholic faith, in their attachment to the Roman pontiff, without ever adopting the doctrine of the Monophyfites or Monothelites. But all their efforts are infufficient to prove the truth of thefe affertions to fuch as have any acquaintance with the hiftory of the church, and the records of ancient times; for to all fuch, the teftimonies they allege will appear abfolutely fictitious and deftitute of authority. Eccl. Hift. vol. ii.

Fauftus Nairon, a Maronite, fettled at Rome, has publifhed an apology for Maron, and the reft of his nation. His tenet is, that they really took their name from the Maron who lived about the year 400, and of whom mention is made in Chryfoftom, Theodoret, and the Menologium of the Greeks. He adds, that the difciples of this Maron fpread themfelves throughout all Syria; that they built feveral monafteries, and, among others, one that bore the name of their leader; that all the Syrians, who were not tainted with herefy, took refuge among them; and that, for this reafon, the heretics of thofe times called them Maronites.

Volney traces the origin of the Maronites, called alfo *Mawarna*, at the end of the fixth age of the church, to a hermit named Maroun, who lived on the banks of the Orontes, and who, by his fafting, his reclufe mode of life, and his aufterities, became much refpected by the neighbouring people. It feems that, in the difputes which at that time arofe between Rome and Conftantinople, he employed his credit in favour of the weftern Chriftians. His death gave new energy to the zeal of his followers; and it was reported that miracles were wrought by his remains; hence many perfons affembled from Kinefrin, Awafem, and other places, who built at Hama a chapel and a tomb, whence foon arofe a convent, very celebrated in that part of Syria. As quarrels between the two metropolitan churches increafed, a monk, named John the Maronite, about the end of the feventh century, obtained, by his talents for preaching, the reputation of being one of the moft powerful fupporters of the caufe of the Latins, or partifans of the pope. Their opponents, who efpoufed the caufe of the emperor, and were on this account called Melkites, or royalifts, made at that time great progrefs in Lebanon. In order fuccefsfully to counteract them, the Latins fent among them John the Maronite, who, having been prefented to the agent of the pope at Antioch, and duly confecrated bifhop of Djebail, was fent to preach in thofe countries. John, collecting his partifans, and augmenting their number, found it neceffary to refift the force of the Melkites by force; and having affembled all the Latins, he fettled with them at Lebanon, and there formed a fociety independent with refpect to both its civil and religious government. John, having eftablifhed order and military difcipline among the mountaineers, and having provided them with arms and leaders, they employed their liberty in combating the common enemies of the empire and of their little ftate; and prefently became mafters of almoft all the mountains as far as Jerufalem. A fchifm likewife took place among the Mahometans, which facilitated their conquefts. After a variety of events, partly propitious and partly difaftrous, about the year 1215 the Maronites effected a re-union with Rome, from which they were never widely feparated, and which ftill fubfifts. William of Tyre, who gives this relation, obferves that they had 40,000 men able to bear arms. The peace they enjoyed under the Mamlouks was difturbed by Selim II., but the time and attention of this prince being occupied about other objects, they joined the Druzes and their emir in making encroachments on the Ottomans; but thefe commotions iffued unfortunately; for Amurath III., fending againft them Ibrahim, pacha of Cairo, that general reduced them to obedience in 1588, and fubjected them to the annual tribute which they ftill pay. Since that period, the pachas, defirous of extending their authority and extortions, have frequently attempted to introduce their garrifons and agas into the mountains of the Maronites; but being conftantly repulfed, they have been compelled to abide by their treaties. The fubjection of the Maronites, therefore, only confifts in the payment of a tribute to the pacha of Tripoli, of whom they hold their country, which he annually farms out to one or more fhaiks, that is, perfons of eminence and property, who affign their refpective fhares to the diftricts and villages. This impoft is levied chiefly on the mulberry-trees and vineyards, which are the principal, and almoft the fole objects of culture. The form of government is founded, not on any exprefs convention, but merely on ufages and cuftoms. This inconvenience would long ere this have produced difagreeable effects, if they had not been prevented by many fortunate circumftances. The principal of thefe is religion, which, placing an infurmountable barrier between the Maronites and the Mahometans, has precluded ambitious men from leaguing themfelves with foreigners to enflave their countrymen. The fecond is the nature of the country, which every where affording ftrong defences, enables every village, and almoft every family, to oppofe, by its fingle force, all ufurpation of fovereign power. A third reafon may be derived even from the weaknefs of this fociety, which having been always furrounded by powerful enemies, has only been able to refift them by maintaining union among its members, which union can only fubfift by abftaining from oppreffing each other, and by reciprocally guarding the fafety of each others perfon and property. Thus the government preferves a natural equilibrium, and, cuftoms fupplying the place of laws, the Maronites are, to this day, equally ftrangers to the oppreffions of defpotifm and the diforders of anarchy.

The nation may be confidered as divided into two claffes, the common people and the fhaiks; by which muft be underftood the moft eminent of the inhabitants, who, from the antiquity of their families, and the opulence of their fortunes, are fuperior to the ordinary clafs. They all live difperfed in the mountains, in villages, hamlets, and even detached

tached houfes; which is never the cafe in the plains. The whole nation confifts of cultivators. Every man improves the little domain he poffeffes, or farms, with his own hands. Even the fhaiks live in the fame manner, and are only diftinguifhed from the reft by a bad pelifs, a horfe, and a few flight advantages in food and lodging: they all live frugally, without many enjoyments, but alfo with few wants, as they are little acquainted with the inventions of luxury. In general, the nation is poor, but no one wants neceffaries; and if beggars are fometimes feen, they come rather from the fea-coaft than the country itfelf. Property is as facred among them as in Europe, nor do we fee there thofe robberies and extortions fo frequent with the Turks. Travellers may journey there, either by night or day, with a fecurity unknown in any other part of the empire, and the ftranger is received with hofpitality, as among the Arabs; it muft be owned, however, that the Maronites are lefs generous, and rather inclined to the vice of parfimony. Conformably to the doctrines of Chriftianity, they have only one wife, whom they efpoufe frequently, without having feen, and, always without having been much in her company. Contrary to the precepts of that fame religion, however, they have admitted, or retained, the Arab cuftom of retaliation, and the neareft relation of a murdered perfon is bound to avenge him. From a habit founded on diftruft, and the political ftate of the country, every one, whether fhaik or peafant, walks continually armed with a mufket and poniards. This is, perhaps, an inconvenience; but this advantage refults from it, that they have no novices in the ufe of arms among them, when it is neceffary to employ them againft the Turks. As the country maintains no regular troops, every man is obliged to join the army in time of war, and if this militia were well conducted, it would be fuperior to many European armies. From accounts taken in late years, the number of men, fit to bear arms, amounts to thirty-five thoufand. According to the ufual mode of computation, this would imply a population of about a hundred and five thoufand fouls; and, if we add the priefts, monks, and nuns, difperfed in upwards of two hundred convents, and the inhabitants of the maritime towns, fuch as Djebail, Batroun, &c. we cannot fuppofe it lefs than a hundred and fifteen thoufand.

This number, compared with the extent of the country, which is about a hundred and fifty leagues fquare, gives feven hundred and fixty inhabitants for each fquare league; which will not appear a fmall population, when we confider that great part of Lebanon confifts only of barren rocks, and that the foil, even where it can be cultivated, produces very little.

In religious matters, the Maronites are dependent on Rome. Though they acknowledge the fupremacy of the pope, their clergy continue, as heretofore, to elect a head, with the title of Batrak, or patriarch of Antioch. Their priefts marry, as in the firft ages of the church; but their wives muft be maidens, and not widows, nor can they marry a fecond time. They celebrate mafs in Syriac, of which the greateft part of them comprehend not a word. The gofpel, alone, is read aloud in Arabic, that it may be underftood by the people. The communion is adminiftered in both kinds. The Hoft is a fmall round loaf, unleavened, of the thicknefs of a finger, and fomething larger than a crown piece. On it is the impreffion of a feal, which is eaten by the prieft, who cuts the remainder into fmall pieces, and, putting them into the cup, adminifters to each perfon with a fpoon which ferves every body. Thefe priefts have not, as among us, benefices or ftated revenues; but they fubfift on the produce of their maffes, the bounty of their hearers, and the labour of their hands. Some of them exercife trades, others cultivate a fmall piece of land, and all are induftriouſly employed, for the maintenance of their families, and the edification of their flock. Their poverty is recompenfed by the great refpect which is paid them; their vanity is inceffantly flattered; whoever approaches them, whether rich or poor, great or fmall, is anxious to kifs their hands, which they fail not to prefent; nor are they pleafed that the Europeans withhold this mark of reverence, fo repugnant to our manners, though not thought humiliating by the natives, who are accuftomed to it from their infancy. In other refpects, the ceremonies of the Catholic religion are not performed more publicly, or with lefs reftraint, in Europe than in the Kefraouan. Each village has its chapel and its prieft, and each chapel its bell: a thing unheard of in any other part of Turkey. The Maronites are vain of this privilege, and that they may not be deprived of it, will not fuffer a Mahometan to live among them. They affume to themfelves, alfo, the privilege of wearing the green turban, which, except in their territories, would coft a Chriftian his life.

In the fmall country of the Maronites there are reckoned upwards of two hundred convents for men and women. Thefe religious are of the order of St. Anthony, whofe rules they obferve with an exactnefs which reminds us of earlier times. The drefs of the monks is made of brown coarfe woollen ftuff, and refembles that of the Capuchin friars in Europe. Their food is the fame as that of the peafants, with this exception, that they never eat flefh. They obferve frequent fafts, and make long prayers at ftated hours in the night as well as the day; the remainder of their time is employed in cultivating the earth, or breaking the rocks to form the walls of the terraces which fupport their vineyards and mulberry plantations. Each convent has a brother fhoemaker, a brother taylor, a brother weaver, a brother baker; in a word, an artift of every neceffary trade. We almoft always find a convent of women clofe to one of men; yet it is rare to hear of any fcandalous report. Thefe women themfelves lead a very laborious life, and it is this activity, doubtlefs, which fecures them againft all the mifchiefs attendant on idlenefs. So far, therefore, from being injurious to population, we may affirm that thefe convents have contributed to promote it, by increafing by culture every article in a proportion greater than its confumption. The moft remarkable of the houfes of the Maronite monks is Kozhaia, fix hours journey to the eaft of Tripoli. There they exorcife, as in the firft ages of the church, thofe who are ftill poffeffed with devils; for fuch perfons are ftill to be found in thefe countries. From the account, fays Volney, given me by intelligent obfervers, it appears that thofe poffeffed are no other than perfons afflicted with idiocy, madnefs and epilepfies; and it is worth remarking, that poffeffion and epilepfy are denoted by the fame Arabic word, *kabal* and *kabat*.

The court of Rome, in affiliating the Maronites, has granted them an hofpitium, at Rome, to which they may fend feveral of their youth, to receive a gratuitous education. It fhould feem that this inftitution might introduce among them the ideas and arts of Europe; but the pupils of this fchool, limited to an education purely monaftic, bring home nothing but the Italian language, which is of no ufe, and a ftock of theological learning, from which as little advantage can be derived; they accordingly foon affimilate with the reft. Nor has a greater change been operated by the three or four miffionaries maintained by the French capuchins at Gazir, Tripoli, and Bairout. Their labours confift in preaching in their church, in inftructing children in the catechifm, Thomas à Kempis, and the Pfalms, and in teaching them to read and write. Formerly the Jefuits had

had two miffionaries at their houfe at Antoura, and the Lazarites have now fucceeded them in their miffion. The moft valuable advantage that has refulted from thefe apoftolical labours is, that the art of writing has become more common among the Maronites, and rendered them, in this country, what the Copts are in Egypt; that is, they are in poffeffion of all the pofts of writers, intendants, and kiayas among the Turks, and efpecially of thofe among their allies and neighbours, the Druzes. Volney's Travels in Egypt and Syria, vol. ii.

Mofheim obferves, that the fubjection of the Maronites to the fpiritual jurifdiction of the Roman pontiff, was agreed to with this exprefs condition, that neither the popes nor their emiffaries fhould pretend to change or abolifh any thing that related to the ancient rites, moral precepts, or religious opinions of this people: fo that, in reality, there is nothing to be found among the Maronites that favours of popery, if we except their attachment to the Roman pontiff, who is obliged to pay very dear for their friendfhip. For, as the Maronites live in the utmoft diftrefs of poverty, under the tyrannical yoke of the Mahometans, the bifhop of Rome is under the neceffity of furnifhing them with fuch fubfidies as may appeafe their oppreffors, procure a fubfiftence for their bifhop and clergy, provide all things requifite for the fupport of their churches, and the uninterrupted exercife of public worfhip, and contribute in general to leffen their mifery. It is certain that there are Maronites in Syria, who ftill behold the church of Rome with the greateft averfion and abhorrence; nay, what is ftill more remarkable, great numbers of that nation refiding in Italy, even under the eye of the pontiff, oppofed his authority during the 17th century, and threw the court of Rome into great perplexity. One body of thefe non-conforming Maronites retired into the vallies of Piedmont, where they joined the Waldenfes; another, above fix hundred in number, with a bifhop, and feveral ecclefiaftics at their head, flew into Corfica, and implored the protection of the republic of Genoa, againft the violence of the inquifitors. Eccl. Hift. vol. iii.

The Maronites have a patriarch, who refides in the monaftery of Cannubin, on mount Libanus, and affumes the title of patriarch of Antioch, and the name of Peter, as if he feemed defirous of being confidered as the fucceffor of that apoftle. He is elected by the clergy and the people, according to the ancient cuftom; but, fince their re-union with the church of Rome, he is obliged to have a bull of confirmation from the pope. He keeps a perpetual celibacy, as well as the reft of the bifhops his fuffragans: as to the reft of the ecclefiaftics, they are allowed to marry before ordination; and yet the monaftic life is in great efteem among them. The monks are of the order of St. Anthony, and live in the moft obfcure places in the mountains, far from the commerce of the world.

As to their faith, they agree in the main with the reft of the Eaftern church. Their priefts do not fay mafs fingly; but all fay it together, ftanding round the altar. They communicate in unleavened bread; and the laity have hitherto partaken in both kinds, though the practice of communicating in one has of late been getting footing, having been introduced by little and little. In Lent they eat nothing, unlefs it be two or three hours before fun-rifing: their other faftings are very numerous.

MAROO, in *Geography*, a town of Hindooftan, in the circar of Ruttunpour; 18 miles N.W. of Ruttunpour.

MAROON, *To*, in *Sea Language*, is to put one or more failors afhore upon a defolate ifland, under the pretence of their having committed fome great crime. This deteftable expedient has been repeatedly practifed by fome inhuman commanders of merchant-fhips, particularly in the Weft Indies.

MAROONGAS, in *Geography*, a fmall ifland in the Sooloo Archipelago. N. lat 6° 3′. E. long. 120° 58′.

MAROONS. See JAMAICA.

MAROOTS, ORAN IDAANS, or *Idahans*, people who inhabit the N. part of the ifland of Borneo, near and upon the fkirts of the high mountain of Keneebaloo; called, in old maps, "St. Peter's Mount." Thefe people believe that the deity is pleafed with human victims. An Idaan or Maroot muft, once at leaft in his life, have imbrued his hands in a fellow-creature's blood. The rich are faid to do it often, adorning their houfes with fkulls and teeth, to fhew how much they have honoured their author, and laboured to avert his chaftifement. Several in low circumftances will club to buy a Bifayan Chriftian flave, or any one that is to be fold cheap; that all may partake the benefit of the execution. Some alfo believe that thofe, whom they kill in this world, will ferve them in the next. They are acquainted with a fubtle poifon, called *ippoo*, the juice of a tree, in which they dip fmall darts; and thefe they fhoot through a hollow piece of wood, called by the Sooloos "Sampit," from which iffues inftant death, to any one who is wounded by them. The Idaans pen hogs, and eat pork. They carry their rice, fruits, &c. to the fea-fide, and buy falt from the Badjoos, who often manufacture it by gathering fea-weeds and burning them, making a ley of afhes, filtering it, and forming a better kind of falt in fquare pieces, by boiling it in pans made of the bark of the aneabong. Thefe pieces of falt are carried to market, whither both the Idaans and Muffulmen refort, and pafs as a currency for money. The Mahometans preclude Europeans, as much as they can, from having intercourfe with the Idaans and Maroots; but at Balambangan, and on the ifland Labuan, near Borneo, the Idaans in their boats bring hogs, fruits, &c. and are glad to fee the Englifh eat pork like themfelves. Foreft's Voyage.

MAROS, a town on the W. coaft of the ifland of Celebes. N. lat. 4° 47′. E. long. 120° 6′.

MAROS, a river of Hungary, which rifes on the borders of Moldavia, and runs into the Theyffe, near Zegedin.

MAROSTICA, a town of Italy, in the Vicentin, encompaffed with walls, and containing feveral churches; 11 miles N. of Vicenza.

MAROTIC STYLE, in the *French Poetry*, denotes a peculiarly gay, pleafant, yet fimple and natural manner of writing, introduced by Clement Marot, and fince imitated by other authors, but with moft fuccefs by De la Fontaine and Rouffeau.

The difference between the Marotic and the burlefque ftyle is thus affigned: the Marotic makes a choice; the burlefque admits of all. The firft is the moft fimple; but its fimplicity has its noblenefs; and, where its own age will not furnifh natural expreffions, it borrows them from former times: the latter is low and grovelling, and borrows falfe and fulfome ornaments from the crowd, which people of tafte defpife. The one refigns itfelf to Nature; but examines, firft of all, whether the objects fhe prefents be fit for its paintings, and takes nothing but what carries with it fomewhat of delicacy and mirth: the other runs headlong into buffoonery, and affects every thing that is extravagant and grotefque. See BURLESQUE.

MAROTTI, in *Botany*, is a tall tree growing in Malabar, with leaves like thofe of the bay, bearing a round oblong fruit, including a very large, hard, and yellowifh ftone, containing ten or eleven kernels. The oil extracted from the feeds or kernels of the fruit, eafes pains, and cures the ſcabies and itchings, being rubbed on the parts: it is good alſo for eyes infeſted with ſalt humours; and, mixed with aſhes, it is ſucceſsfully applied to impoſthumes and abſceſſes in cows, and other cattle and beaſts of burden. Rai Hiſt. Plant.

MAROUPOLE, in *Geography*, a town of Auſtrian Poland, in Galicia; 60 miles E.N.E. of Lemberg.

MAROWLY, a town of Hindooſtan, in the circar of Gohud; 15 miles S. of Narwa.

MAROZZO, a town of Naples, in Abruzzo Citra; 20 miles S.E. of Lenciano.

MARPACH, a town of Auſtria; 6 miles E. of Steyragg.—Alſo, a town of Wurtemberg, on the Neckar; 8 miles N.N.E. of Stuttgard. N. lat. 48° 58'. E. long. 9° 21'.

MARPESUS, the moſt lofty mountain in the iſland of Paros, ſituated W. of the harbour of Marmora, which furniſhed more particularly the marble obtained by the Greeks from Paros.

MARPESSUS, in *Ancient Geography*, a town of Phrygia, on mount Ida. Pauſanias (l. x. c. 12.) places it among the Phocæans, at 240 ſtadia from Alexandria of the Troade, in the vicinity of the river Ladon.

MARPURG, Frederic Wilhelm, in *Biography*, an eminent and voluminous writer on muſic, and a compoſer, at Berlin, whoſe works on the theory and practice of the art may be juſtly ſaid to ſurpaſs in number and utility thoſe of any other author who has treated on the ſubject. He was, perhaps, the firſt German theoriſt who could patiently be read by perſons of taſte, ſo addicted were former writers to prolixity and pedantry.

This author's *coup d'eſſai*, as a muſical writer, was a periodical work, entitled "The Muſical Critic on the Spree, 1747." Then followed his "Art of playing the Harpſichord, in Three Parts," from 1750 to 1755. After which "A Treatiſe upon Fugue and Counterpoint," in German, 1753, and in French, 1756. This is the beſt book of the kind that is extant, except Padre Martini's "Saggio di Contrappunto," which, for vocal fugues, is perhaps ſuperior; but for inſtrumental, M. Marpurg's work is ſtill more uſeful. The hiſtorical part, however, is ſcanty and inaccurate: for, in the enumeration of organiſts of different countries, though M. Marpurg, who had been in France and civilly treated there, is very grateful, yet he mentions no Engliſh compoſer of any kind but the feeble and flimſy Felting, who, though a worthy man and much eſteemed by his friends, was far from a great player or good compoſer. Among organiſts, he juſt mentions Stanley and Keeble; but of Handel's ſublime oratorio choruſes and manner of playing the organ he is wholly ſilent; nor does he ever ſeem to have heard of our Roſeingrave, Magnus, J. James, Kelway, or Worgan, who, in 1756, was an excellent extempore fughiſt. And the examples of canon and fugue are too indiſcriminately given to ſerve as models of excellence to young ſtudents. Indeed, M. Marpurg was ſo ingenuous as to confeſs to us, at Berlin, that he had injured his work by partiality to friends, whoſe productions he had frequently cited, againſt his judgment. About this time, 1756, fugues began to loſe their favour, even in Germany, where their reign had been long and glorious; but Rouſſeau's "Lettre ſur la Muſique Françoiſe," and the beautiful melody, taſte, expreſſion, and effects of theatrical compoſitions, ſo much cultivated in Italy and in all the German courts, brought about a general revolution in muſic, which Vinci, Haſſe, and Porpora began, and Pergoleſi finiſhed. In 1754, M. Marpurg began the publication of his "Hiſtorical and Critical Eſſays towards the Advancement of Muſic;" this work was cloſed in 1762, and conſiſts of five volumes octavo. Theſe eſſays, with his "Critical Letters on the Art of Muſic," from 1760 to 1762, called the attention of Germany to muſical criticiſm; which Hiller's weekly eſſays on the ſame ſubject continued from 1764 to 1770. The chief of M. Marpurg's works, theoretical and practical, which are very numerous, were publiſhed between 1749 and 1763, about which time he was appointed by the king of Pruſſia ſecretary of aſſize. After this he devoted his whole time to political calculations, except what he beſtowed on muſical ratios in an "Eſſay on Temperament," to which he added an appendix on Rameau's and Kirnberger's rules for accompaniment or thorough-baſe, 1770, 8vo.

Of M. Marpurg's compoſitions in muſic, though much original genius may not be diſcoverable in them, they are clear and correct; and if they do not excite rapture by ſtrokes of novelty, fire, or pathos, they can never offend. But he was ſurrounded at Berlin by muſicians of the higheſt order; by the Grauns, the Bendas, Emanuel Bach, &c. and he had no chance of rivalling them in point of genius; but as a writer on muſical ſubjects, he certainly ſurpaſſed all his predeceſſors and contemporaries in the German language, in clearneſs, elegance, and extenſive acquaintance with the hiſtory and rules of the art.

Marpurg, in *Geography*. See Marburg.

MARQUARTSBURG, a town of Germany, in the territory of Nuremberg; 9 miles N.N.E. of Nuremberg.

MARQUARTSTEIN, a town of Bavaria, on the Ache; 25 miles W. of Salzburg.

MARQUE, La, a town of France, in the department of the Gironde; 18 miles N.N.W. of Bourdeaux.

Marque, *Law of*. See Law.

Marque, *Letters of*, are letters of repriſal granted by a king or ſtate, whereby the ſubjects of one country are licenſed to make repriſals on thoſe of another; by reaſon application has been made for redreſs to the government to which the aggreſſor belongs, three times without effect.

The firſt letter of marque, of which we have any account in the hiſtory of this country, was iſſued by Edward I. in 1295, againſt the ſubjects of Portugal.

Theſe letters are grantable by the law of nations, whenever the ſubjects of one ſtate are oppreſſed and injured by thoſe of another; and juſtice is denied by that ſtate to which the oppreſſor belongs: and with us it is declared by ſtat. 4 Hen. V. cap. 7, that if any ſubjects of the realm are oppreſſed in time of truce by any foreigners, the king will grant marque in due form, to all that feel themſelves aggrieved. Which form is thus directed to be obſerved: the ſufferer muſt firſt apply to the lord privy-ſeal, and he ſhall make out letters of requeſt under the privy-ſeal: and if, after ſuch requeſt of ſatisfaction made, the party required do not, within convenient time, make due ſatisfaction or reſtitution to the party grieved, the lord chancellor ſhall make him out letters of marque, under the great ſeal: and by virtue of theſe he may attack and ſeize the property of the aggreſſor nation, without hazard of being condemned as a robber or pirate. Blackſt. Com. vol. i.

They are ſo called from the German *marcke, limit, frontier*; as being *jus conceſſum in alterius principis marcas ſeu limites tranſeundi, ſibique jus faciendi*; as being a right of paſſing the limits or frontiers of another prince, and doing oneſelf juſtice. See Letters and Repriſals.

In matters of inſurance, if, after a policy is effected on a merchant-ſhip, letters of marque be put on board, and from a mere private trader, ſhe is changed into a ſhip of war, with

 power

power not only to defend herfelf, but to cruife and take prizes; this is fuch an alteration of the condition of the fhip, that the rifk muft be materially changed from that which the underwriter took upon himfelf, and confequently the contract is thereby determined. Thus, a cafe occurs, in which a fhip, infured as a private trader, afterwards takes letters of marque, without the confent of the underwriters, this difcharges the underwriters, though no ufe be made of the letters of marque. In another cafe, letters of marque were taken out, but without the proper certificate, and only to entice feamen to enter, without any intention of cruifing; this did not vary the rifk, fo as to avoid the policy, even though the captain, againft his inftructions, cruifed and took prizes. When the feamen were procured, thefe letters of marque could have no legal effect, and thus it was the fame as if no letters of marque had been on board. When no certificate of clearance is taken out, in purfuance of the ftat. 33 Geo. III. c. 66, the letters of marque are declared void; and the captain is fubjected to a penalty for departing without it.

MARQUESAS, Les Marquisses, or *Marquis of Mendoça's Iflands*, a group of iflands in the South Pacific ocean, firft difcovered in 1595 by Alvaro Mendāna de Neyrā; and vifited by Capt. Cook in the year 1774, by Marchand in 1791, and by the Miffionaries in 1797; of which we have an account by thefe feveral navigators, and alfo by Mr. George Forfter, Mr. Reinhold Forfter, Capt. Chanal, and furgeon Roblet. Thefe iflands are five in number, *viz.* La Magdalena or Madalena, at the diftance of eight leagues to the fouth by eaft from the middle of the group, nearly in the latitude of 10° 25′, long. 138° 50′; St. Pedro or O-Niteio, about three leagues in circuit, and of a good height, lying fouth, 4½ leagues from the E. end of La Dominica, not known by Capt. Cook to be inhabited; La Dominica or O-Hivahōa. (See La Dominica.) Figueroa, in his account of Mendana's voyage, reprefents this ifland as exhibiting an enchanting afpect: according to him, vaft plains difplayed a fmiling verdure, and divided hills, which rofe with a gentle acclivity, and were crowned by tufted woods; while a numerous population announced the richnefs and fertility of the foil. However, after an interval of two centuries, that elapfed between the two voyages of Mendana and Cook, this ifland prefented to Mr. G. Forfter a very different appearance. He defcribes it as a high and mountainous ifland, of which the N.E. point is very fteep and barren; but farther to the N. he obferved fome vallies filled with trees, among which was now and then difcovered a hut. As the haze cleared away, "we faw," fays this writer, "many craggy rocks like fpires, and feveral hollow fummits piled up in the centre of the ifland, which proves that volcanoes and earthquakes had been active there in changing the face of the country. All its eaftern part is a prodigious fteep and moft perpendicular wall, of a great height, which forms a fharp ridge, fhattered into fpires and precipices." This difference of appearance, according to the defcriptions of two writers, is afcribed by Marchand to the terrible effect of one of thofe great convulfions of nature, which totally disfigure the parts of the furface of the globe on which their ravage is exercifed. The next ifland is Santa Chriftina, or *Chriftiana*, which fee; and Hood's ifland, which is the northernmoft, fituated in S. lat. 9° 26′, and N. 13° W., 5½ leagues diftant from the E. point of La Dominica. (See Hood's *Ifland*.) Thefe ifles occupy one degree in latitude; and near half a degree in longitude, *viz.* from 138° 47′, to 139° 13′ W., which is the longitude of the W. end of La Dominica. The trees, plants, and other productions of thefe ifles, fays Capt. Cook, fo far as we know, are nearly the fame as at Otaheite, and the Society Ifles. The refrefhments they afford are hogs, fowls, plantains, yams, and fome other roots; likewife bread-fruit and cocoa-nuts, but of thefe not many. At firft thefe articles were purchafed with nails, beads, looking-glaffes, and fuch trifles, which were fo highly valued at the Society Ifles, but were in no efteem here; and even nails, at laft, loft their value for other articles far lefs ufeful. The inhabitants of thefe iflands, collectively, are without exception the fineft race of people in this fea. For fine fhape and regular features, they perhaps furpafs all other nations. Neverthelefs, the affinity of their language to that fpoken in Otaheite and the Society Ifles, fhews that they are of the fame nation. The men are punctured, or curioufly *tattooed*, from head to foot. The figures are various, and feem to be directed more by fancy than cuftom. Thefe punctures make them appear dark; but the women, who are but little punctured, youths, and young children who are not at all, are as fair as fome Europeans. The men are, in general, tall; that is, about five feet ten inches, or fix feet; but none were obferved fat and lufty like the "Earees" of Otaheite, nor were any feen that could be called meagre. Their teeth are not fo good, nor are their eyes fo full and lively as thofe of many other nations. Their hair, like ours, is of many colours, except red, of which Capt. Cook faw none. Some have it long, but the more general cuftom is to wear it fhort, except a bunch on each fide of the crown, which they tie in a knot. They obferve different modes in trimming the beard, which is, in general, long. Some part it, and tie it in two bunches under the chin; others plait it; fome wear it loofe, and others quite fhort.

Their clothing is the fame as at Otaheite, and made of the fame materials; they are neither fo plentiful nor fo good. The men have, for the moft part, nothing to cover their nakednefs, except the "Marra," as it is called at Otaheite; which is a flip of cloth paffed round the waift and betwixt the legs. This fimple drefs is fufficient for the climate, and anfwers every purpofe which modefty requires. The drefs of the women is a piece of cloth, wrapped round the loins like a petticoat, which reaches down below the middle of the leg, and a loofe mantle over the fhoulders. Their principal head-drefs, which appears to be their chief ornament, is a fort of broad fillet, curioufly wrought of the fibres of the hufk of cocoa-nuts. In the front is fixed a mother-of-pearl fhell, wrought round to the fize of a tea-faucer. Before that, another, fmaller, of very fine tortoife-fhell, perforated into curious figures. Alfo before, and in the centre of that, is another round piece of mother-of-pearl, about the fize of half a crown; and before this another piece of perforated tortoife-fhell, the fize of a fhilling. Befides this decoration in front, fome have it alfo on each fide, but in fmaller pieces; and all have fixed to them the tail-feathers of cocks or tropic-birds, which, when the fillet is tied on, ftand upright; fo that the whole together makes a very fightly ornament. They wear round the neck a kind of ruff or necklace, made of light wood, the outer and upper fide being covered with fmall red peas, which are fixed on with gum. They alfo wear fmall bunches of human hair, faftened to a ftring, and tied round the legs and arms. Sometimes, inftead of hair, they make ufe of fhort feathers; but all the above-mentioned ornaments are feldom feen on the fame perfon. Their ordinary ornaments are necklaces and amulets made of fhells, &c. None were obferved with ear-rings, and yet all had their ears pierced. Their dwellings are in the vallies, and on the fides of the hills, near their plantations. They are built like thofe of Otaheite; but much meaner, and only covered with the leaves of the bread-tree. Moft of them are built on a fquare, or oblong pavement of ftone, raifed fome height above the level of the ground. They have alfo fuch pavements near their houfes, on which they fit to eat and amufe themfelves. In their mode of eating, thefe people, fays Capt. Cook, are not fo cleanly as the Otaheiteans. In their cookery they were alfo dirty. Pork and fowls are dreffed in an oven of hot ftones, as at Otaheite; but fruit and roots they roaft on the fire, and after taking off the rind or fkin, put them into a platter or trough with water, out of which men and hogs eat at the fame time. Capt. Cook could not fay, whether it was the cuftom for men and women to have feparate meffes.

They feemed to have dwellings, or ftrong holds, on the fummits of the higheft hills. Their weapons are clubs and fpears, refembling thofe of Otaheite, but fomewhat neater. They have alfo flings, with which they throw ftones with great velocity, and to a great diftance, but not with a good aim. Their canoes are made of wood, and pieces of the bark of a foft tree, which grows plentifully near the fea, and is very tough and proper for the purpofe. They are from 16 to 20 feet long, and about 15 inches broad; the head and ftern are made of two folid pieces of wood; the ftern rifes or curves a little, but in an irregular direction, and ends in a point; the head projects out horizontally, and is carved into fome rude refemblance of a human face. They are rowed by paddles, and fome have a fort of latteen fail made of matting. Hogs were the only quadruped feen by our navigators; and cocks and hens the only tame fowls. However, the woods feemed to abound with fmall birds of a very beautiful plumage, and fine notes; but the fear of alarming the natives hindered their fhooting fo many of them as they might otherwife have done. For further particulars relating to the difpofition and manners, &c. of the Mendoçans, we refer to captain Marchand's account, given under the article *Santa* CHRISTIANA. We fhall here add fome relations, that ferve to correct or to enlarge the account of thefe people furnifhed by Capt. Cook. Capt. Chanal, cited by Marchand, is very far from confirming the reproach of filthinefs, which Capt. Cook has applied to thefe iflanders; he fays, on the contrary, that, having repeatedly been prefent at their meals, for which men, women, and children of the fame houfe affemble twice a day, at noon and before night-fall, he was furprifed at the great cleanlinefs which prevailed, and which is obfervable in their whole habitation; he adds, that he has feen the inhabitants of La Madre de Dios, in the ifland of Santa Chriftiana, make very frequent ufe of water for wafhing themfelves. Surgeon Roblet alfo fays, that both men and women pafs whole days in the water. To their frequent ufe of water, is afcribed their freedom from cutaneous difeafes, pimples, ulcers, &c. which are common in the burning climates of the torrid zone. It is affirmed, that in various refpects they are more cleanly than the inhabitants of Otaheite, extolled by Capt. Cook. Their diet, it is obferved, is more vegetable than animal. From the cocoa-nut they extract an oil, which is probably employed in the feafoning of their difhes; and which is principally ufed to anoint their whole body; and the women efpecially confume a great quantity of it for maintaining the glofs and beauty of their hair. Their common drink is pure water, and, occafionally, cocoa-nut milk. As they have the pepper-root, and make ufe of it as a fign of peace, it is fuppofed, that they may alfo prepare the fame dainty beverage from it, with which the other iflanders intoxicate themfelves. Capt. Chanal prefumes, not without reafon, that they procure a ftrong liquor from the root of ginger, rather than from that of pepper. This beverage, however, they ufe with moderation, for Marchand fays, that no individual was feen here, who manifefted the flighteft appearance of intoxication. Their mode of building their houfes on ftone platforms, and their ufe of ftilts, the ftructure of which is particularly defcribed by Marchand, indicate that the ifland of Chriftina muft be expofed to inundations. Of thefe ftilts, curioufly conftructed, the natives of this ifland make a very dextrous ufe; and it is faid, that in a race, they would difpute the palm with the moft experienced herdfman of France.

It does not appear that in Santa Chriftina, they have either laws or chiefs; ftrength being every thing, and the weak obeying the ftrong. Of their religion, we have no better information than of their government. During the ftay which the French made in this ifland, they faw nothing which could make them think, that its inhabitants paid any worfhip to a fupreme being; pleafure, fays Marchand, is the divinity of the country; no fuperftition, no ceremony, no prieft or juggler. In the Miffionary voyage, we have the following account of the cuftoms and manners of the people about Refolution bay, more efpecially as they relate to religion, and they are different from the account given by the French voyagers. "Their religious ceremonies refemble thofe of the Society iflands. They have a Morai in each diftrict, where the dead are buried beneath a pavement of large ftones, but with fuch exceptions, as in the cafe of the chief Hōnoo. They have a multitude of deities. Thofe moft frequently mentioned are Opooamanue, Okeco, Oenamoe, Opeepeetye, Onooko, Oetanow, Fatu-ait-poo, Onoetye; but none who feem fuperior to the reft, though the extent of my information (fays the Miffionary) is fmall on this head. They only offer hogs in facrifices, and never men. The chief Tēnae prefides over four diftricts, Ohitahoo, Takeway, and Innamei, all opening into Refolution bay, and Onopoho, the adjoining valley to the fouthward. He has four brothers; but none of them feem invefted with any authority; and Tēnae himfelf with lefs than the Otaheitean chiefs. There is no regular government, eftablifhed law, or punifhment; but cuftom is the general rule."

As to their food, we are informed that they have no regular meals, but eat when they are hungry. When they have a hog, they eat of it five or fix times a day; and when without animal food, they ufe the roafted bread-fruit, fifh, mahie, pudding made of it and other vegetables, ahee-nuts, and a pafte made of a root refembling the yam; and this they often do through the day. The women are not allowed to eat hog, and are probably reftrained by other prohibitions as at Otaheite, and feem much more fervile to the men, and harfhly treated. They are employed in making cloth and matting, but not in cookery, except for themfelves. "I have never obferved (fays one of the miffionaries) any of the men, from the chief to the touteu, at work, except a few old perfons making cords and nets: the reft idle about, and bafk in the fun, telling their ftories, and beguiling the time." As far as concerns the perfons, drefs, canoes, &c. of thefe people, the miffionaries found them exactly as they are defcribed in Cook's fecond voyage.

As to the population of thefe iflands, we have no fatisfactory account. The number of inhabitants, fays Mr. G. Forfter, cannot be very confiderable, on account of the fmall fize of the iflands which they occupy. Such fpots as are fit for culture in thefe iflands are very populous; but as they are all very mountainous, and have many inacceffible and barren rocks, it is to be doubted whether the whole population of this group amounts to 50,000 perfons. From Marchand's voyage, and the ftatement which it contains, it appears that it would be granting much to the ifland of Santa Chriftina to give it 1000 inhabitants for every league of coaft, and in all, 7000; to fuppofe 6000 in La Dominica, which Mr. Forfter, on account of the fterility of the greater part of its foil, rightly prefumes not likely to prefent a population fo numerous as that of S. Chriftina: and to admit 6000 for La Madalena, whofe circuit is fix leagues: the total number of the inhabitants of the three large iflands might then amount to 19,000 individuals, which might be extended to 20,000, if we allow a few inhabitants to the fmall iflands San Pedro and Hood's ifland. This refult is very wide of that of 50,000 individuals according to Mr. Forfter's ftatement; and yet this is fuppofed by the French voyager to be exaggerated. Cook's Second Voyage, vol. i. Marchand's Voyage, vol. i. Miffionary Voyage.

MARQUETRY, *Inlaid Work;* a curious kind of work, compofed of pieces of hard fine wood of different colours, faftened, in thin flices, on a ground, and fometimes enriched with other matters, as tortoife-fhell, ivory, tin, and brafs.

There is another kind of marquetry made, inftead of wood, of glaffes of various colours; and a third, where nothing but precious ftones, and the richeft marbles, are ufed: but thefe are more properly called *mofaic* work. The art of inlaying is very ancient, and is fuppofed to have paffed from the eaft to the weft, as one of the fpoils brought by the Romans from Afia. Indeed, it was then but a fimple thing; nor did it arrive at any tolerable perfection till the fifteenth century, among the Italians. It feems finally to have arrived at its height in the feventeenth century, among the French.

Till John of Verona, contemporary with Raphael, the fineft works of this kind were only black and white, which are what we now call *morefcoes;* but that religious, who had a genius for painting, ftained his woods with dyes, or boiled oils, which penetrated them. But he went no farther than the reprefenting of buildings and perfpectives, which require no great variety of colours. Thofe who fucceeded him, not only improved on the invention of dyeing the woods, by a fecret which they found of burning them without confuming, which ferved exceedingly well for the fhadows; but they had alfo the advantage of a number of fine new woods of naturally bright colours, by the difcovery of America. With thefe affiftances, the art is now capable of imitating any thing; whence fome call it, the *art of painting in wood.* The ground, whereon the pieces are to be arranged and glued, is ordinarily of oak or fir, well dried; and, to prevent warping, it is compofed of feveral pieces glued together. The wood to be ufed, being reduced into leaves of the thicknefs of a line, is either ftained with fome colour, or made black for fhadow: which fome effect by putting it in fand extremely heated over the fire; others by fteeping it in lime-water and fublimate; and others, in oil of fulphur. Thus coloured, the contours of the pieces are formed according to the parts of the defign they are to prefent.

The laft is the moft difficult part of marquetry, and that wherein moft patience and attention are required. The two chief inftruments ufed herein are the faw and the vice; the one to hold the matters to be formed: the other to take off from the extremes, according to occafion. This vice is of wood, having one of the chaps fixed, the other moveable, and is opened and fhut by the foot, by means of a cord faftened to a treadle. Its ftructure is very ingenious, yet fimple enough, and will be eafily conceived from the figure, *Plate* XXIII. *Mifcellany, fig.* 3. The leaves to be formed (for there are frequently three or four of the fame kind formed together) are put within the chaps of the vice, after being glued on the outermoft part of the defign, whofe profile they are to follow: then the workman, preffing the treadle, and thus holding faft the piece, with his faw runs over all the outlines of the defign. By thus joining and forming three or four pieces together, they not only gain time, but the matter is likewife the better enabled to fuftain the effort of the faw; which, how delicate foever it may be, and how lightly foever the workman may conduct it, without fuch a precaution, would be apt to raife fplinters, to the ruin of the beauty of the work.

When the work is to confift of one fingle kind of wood, or of tortoife-fhell, on a copper or tin ground, or *vice verfa*, they only form two leaves on one another, *i. e.* a leaf of metal, and a leaf of wood or fhell: this they call fawing in counter-parts; for by filling the vacuities of one of the leaves by the pieces coming out of the other, the metal may ferve as a ground to the wood, and the wood to the metal.

All the pieces, thus formed with the faw, are marked, to know them again; and the fhadow being given in the manner already mentioned; they veneer or faften each in its place on the common ground; ufing for that purpofe the beft Englifh glue. The whole is then put in a prefs to dry, planed over, and polifhed with the fkin of the fea-dog, wax, and fhave-grafs, as in fimple veneering; with this difference, however, that in marquetry, the fine branches, and feveral of the moft delicate parts of the figures, are touched up, and finifhed with a graver.

They are the cabinet-makers, joiners, and toy-men, among us, who work in marquetry; and the enamellers and ftone-cutters who deal in mofaic work: the inftruments ufed in the former are moftly the fame with thofe ufed by the ebonifts. See Ebony.

MARQUIE, or Marquée, Fr. corrupted from *Marquife*, fignifies a tent or cover made of ftrong canvas or Ruffia-duck, which is thrown over another tent, and ferves to keep out rain.

MARQUION, in *Geography*, a town of France, in the department of the Straits of Calais, and chief place of a canton, in the diftrict of Arras. The place contains 608, and the canton 14,293 inhabitants, on a territory of $137\frac{1}{2}$ kiliometres, in 17 communes.

MARQUIS, or Marquess, *Marchio*, a title given to a perfon in poffeffion of a confiderable demefne erected into a marquifate by letters patent; holding a middle place between the dignity of a duke and that of an earl or count.

The word, according to fome authors, comes from the *Marcomanni*, an ancient people, who inhabited the marches of Brandenburgh. Others derive it from the German *marche*, *limit;* and others from *marcifia*, which, in the Celtic language, fignified *a wing of cavalry*. Nicod derives it from the corrupt Greek *νομαρχια*, *province*. Alciat and Pauchet bring it from *marc*, *horfe*, taking a marquis to be properly an officer of horfe. Menage derives it from *marca*, *frontier;* and Selden, Krantzius, and Hottoman, do the fame. Laftly, Pafquier fetches marquis from the old French *marche*, *limit;* or from *marchir, to confine;* the guard of the frontiers being committed to them. Marquifes were anciently governors of frontier cities or provinces, called *marches*. Such as, in particular, were the marches of Wales and Scotland, while each continued to be an enemy's country. In Germany, they are called *margraves*.

The perfons, who had command there, were called lords marchers, or marquifes; whofe authority was abolifhed by ftatute 27 Hen. VIII. c. 27; though the title had long before been made a mere enfign of honour; Robert Vere, earl of Oxford, being created marquis of Dublin by Richard

chard II. in the eighth year of his reign. 2 Inft. 5. Selden's Titles of Honour, p. 216.

Marquis is originally a French title: the Romans were unacquainted with it. In the Notitia Imperii, they were called *comitatus limitanei*. The firft time we hear of *marquifes*, *marchiones*, is under Charlemagne, who created governors in Gafcony under this denomination.

Alciat has ftarted a queftion, whether a marquis or count fhould have the precedence? To decide it he goes back to the ancient function of counts; and obferves, that counts, who are governors of provinces, are above marquifes, who are only governors of frontiers; and that marquifes, who are governors of frontier cities, are above thofe counts who are governors of fmall towns. He adds, that, in confequence of this diftinction, the book of fiefs fometimes places marquifes above counts, and fometimes counts above marquifes.

Froiffart obferves, that the marquifate of Juliers was erected into a county: but now-a-days, neither marquifes nor counts are any longer governors; and as they are mere titles of honour, the counts make no fcruple of refigning the precedency.

Marquis's *Coronet*. See Crown.

Marquis, *Grand*, in *Geography*, a town on the E. fide of the ifland of Grenada. N. lat. 12° 9'. W. long. 61° 1'.

Marquis, *Cape*, a cape on the N. coaft of the ifland of St. Lucia. N lat. 13° 50'. W. long. 6° 42'.

Marquis *Iflands*, a clufter of fmall iflands in the Florida ftream. N. lat. 24 35'. W. long. 82° 30'.

MARQUISE, a town of France, in the department of the Straits of Calais, and chief place of a canton, in the diftrict of Boulogne. The place contains 1400, and the canton 9262 inhabitants, on a territory of 232½ kiliometres, in 21 communes.

MARR, a divifion of the county of Aberdeen, in Scotland, towards the fouth, between the rivers Dee and Don.

MARRA, in *Ancient Geography*, a town of Afia, in Syria, fituated on an extenfive plain, to the E. of the river Orontes, N.E. of Apamea, and S. of Chalcis. Marra ftill retains its ancient name, and is held by the pacha of Damafcus, as an appanage deriving immediately from the fultan. Homs, Hama, and Marra pay 400 purfes, or about 20,000*l.*; 30 miles N. of Hama.

MARRABOO, a town of Africa, in the kingdom of Bambarra, on the Niger: this town is a confiderable mart for falt, which is brought by the Moors for fale to the Negroes; 150 miles S.W. of Sego. N. lat. 12° 50'. W. long. 5° 10'.

MARRADI, a town of Etruria; N.N.E. of Florence.

MARRAT, a town of France, in the department of the Puy de Dome; nine miles S. of Thiers.

MARRIAGE, a civil and religious contract, whereby a man is joined and united to a woman, for the ends of procreation.

The effence of marriage confifts in the mutual confent of the parties. Marriage is a part of the law of nations, and is in ufe among all people. The Romanifts account it a facrament.

The public ufe of marriage inftitutions confifts, according to archdeacon Paley (Philof. vol. i.), in their promoting the following beneficial effects: 1. The private comfort of individuals: 2. The production of the greateft number of healthy children, their better education, and the making of due provifion for their fettlement in life: 3. The peace of human fociety, in cutting off a principal fource of contention, by affigning one or more women to one man, and protecting his exclufive right by fanctions of morality and law: 4. The better government of fociety, by diftributing the community into feparate families, and appointing over each the authority of a mafter of a family, which has more actual influence than all civil authority put together: 5. The additional fecurity which the ftate receives for the good behaviour of its citizens, from the folicitude they feel for the welfare of their children, and from their being confined to permanent habitations: 6. The encouragement of induftry.

The woman, with all her moveable goods, immediately upon marriage, paffes wholly, *in poteftatem viri*, into the power and difpofal of her hufband.

The firft inhabitants of Greece lived together without marriage. Cecrops, king of Athens, is faid to have been the firft author of this honourable inftitution among that people. After the commonwealths of Greece were fettled, marriage was very much encouraged by their laws, and the abftaining from it was difcountenanced, and in many places punifhed. The Lacedæmonians were very remarkable for their feverity towards thofe who deferred marriage beyond a limited time, as well as to thofe who wholly abftained from it. (See Lacedæmonians.) The Athenians had an exprefs law, that all commanders, orators, and perfons entrufted with any public affair, fhould be married men. Polygamy was not commonly tolerated in Greece. The time of marriage was not the fame in all places; the Spartans were not permitted to marry till they arrived at their full ftrength: the reafon affigned for this cuftom by Lycurgus was, that the Spartan children might be ftrong and vigorous; and the Athenian laws are faid to have once ordered, that men fhould not marry till thirty-five years of age. The feafon of the year which they preferred for this purpofe was the winter, and particularly the month of January, called Gamelion. The Greeks thought it fcandalous to contract marriage within certain degrees of confanguinity; whilft moft of the barbarous nations allowed inceftuous mixtures.

Moft of the Grecian ftates, efpecially fuch as made any figure, required their citizens fhould match with none but citizens, and the children were not allowed to marry without the confent of their parents. The ufual ceremonies in promifing fidelity was kiffing each other, or giving their right hands, which was a general form of ratifying all agreements. Before the marriage could be folemnized, the gods were to be confulted, and their affiftance implored by prayers and facrifices, which were offered to fome of the deities that fuperintended thefe affairs, by the parents, or neareft relations of the perfons to be married. When the victim was opened, the gall was taken out and thrown behind the altar, as being the feat of anger and malice, and therefore the averfion of all the deities who had the care of love, as well as thofe who became their votaries. For the particulars relating to the bride and bridegroom, fee Bride and Bridegroom.

The ceremonies of the Spartan marriages being different from all others, deferve to be mentioned at length, as related by Plutarch. "When the Spartans had a mind to marry, their courtfhip was a fort of rape upon the perfons they had a fancy for; and thofe they chofe not tender and half-children, but in the flower of their age, and full ripe for a hufband. Matters being agreed between them, the νυμφευτρια, or woman that contrived and managed the plot, fhaved off the bride's hair clofe to her fkin, dreffed her up in man's clothes, and left her upon a mattrefs: this done, the bridegroom entered in his common clothes, fober and compofed, as having fupped at his ordinary in the common hall, and ftole as privately as he could into the room where the bride lay, untied her virgin girdle, whence λυειν ζωνην, is *to deflower*, and took her into his embraces. Having ftayed a fhort a ſhort time with her, he returned to his comrades, with whom he continued to ſpend his life, remaining with them as well by night as by day, unleſs when he ſtole a ſhort viſit to his bride; and that could not be done without a great deal of circumſpection, and fear of being diſcovered. Nor was ſhe wanting (as may be ſuppoſed) on her part, to uſe her wit in watching the moſt favourable opportunities for their meeting, and making appointments when company was out of the way. In this manner they lived a long time, inſomuch that they frequently had children by their wives before they ſaw their faces by day-light. The interview being thus difficult and rare, ſerved not only for a continual exerciſe of their temperance, and farthered very much the ends and intentions of marriage, but was a means to keep their paſſion ſtill alive, which flags and decays, and dies at laſt by too eaſy acceſs, and long continuance with the beloved object." Potter, Archæol. book iv. c. xi. p. 295, ſeq.

The Romans, as well as the Greeks, diſallowed of polygamy; and they encouraged marriage by the "jus trium liberorum." A man who had no child was entitled by the Roman law only to one-half of any legacy that ſhould be left him, that is, at the moſt, could receive only one-half of the teſtator's fortune. A Roman might not marry any woman who was not a Roman. Among the Romans, the kalends, nones, and ides of every month, were deemed unlucky for the celebration of marriage, as was alſo the feaſt of the Parentalia, and the whole month of May. The moſt happy ſeaſon in every reſpect was that which followed the ides of June.

The Roman laws ſpeak of ſecond marriages in very hard and odious terms: "Matre jam ſecundis nuptiis funeſtata, L. iii. C. de ſec. nuptiis." By theſe laws it was enacted, that the effects of the huſband or wife deceaſed ſhould paſs over to the children, if the ſurvivor ſhould marry a ſecond time. By the law *Hac edictali*, Cod. de ſec. nupt. the ſurvivor, upon marrying a ſecond time, could not give the perſon he married a portion more than equal to that of each of the children. In the primitive church, the reſpect to chaſtity was carried ſo high, that a ſecond marriage was accounted no other than a lawful whoredom, or a ſpecies of bigamy; and there are ſome ancient canons, which forbid the eccleſiaſtics from being preſent at ſecond marriages.

Marriage, by the Moſaic law, was ſubject to ſeveral reſtrictions: thus by Levit. chap. xviii. ver. 16, a man was forbid to marry his brother's widow, unleſs he died without iſſue; in which caſe, it became enjoined as a duty. So he was forbid to marry his wife's ſiſter, while ſhe was living, ver. 18, which was not forbidden before the law, as appears from the inſtance of Jacob.

The ancient Roman law is ſilent on this head; and Papinian is the firſt who mentions it, on occaſion of the marriage of Caracalla. The lawyers who came after him ſtretched the bonds of affinity ſo far, that they placed adoption on the ſame foot with nature.

Affinity, according to the modern canoniſts, renders marriage unlawful to the fourth generation, incluſive; but this is to be underſtood of direct affinity, and not of that which is ſecondary or collateral. "Affinis mei affinis, non eſt affinis meus." It is farther to be obſerved, that this impediment of marriage does not only follow an affinity contracted by lawful matrimony, but alſo that contracted by a criminal commerce; with this difference, that this laſt does not extend beyond the ſecond generation; whereas the other, as has been obſerved, reaches to the fourth.

In Germany, they have a kind of marriage called *morganatic*, wherein a man of quality contracting with a woman of inferior rank, he gives her the left hand in lieu of the right; and ſtipulates in the contract, that the wife ſhall continue in her former rank or condition, and that the children born of them ſhall be of the ſame; ſo that they become baſtards as to matters of inheritance, though they are legitimate in effect. They cannot bear the name or arms of the family.

None but princes, and great lords of Germany, are allowed this kind of marriage. The univerſities of Leipſic and Jena have declared againſt the validity of ſuch contracts; maintaining, that they cannot prejudice the children, eſpecially when the emperor's conſent intervenes in the marriage.

The Turks have three kinds of marriages, and three ſorts of wives; *legitimate, wives in kebin*, and *ſlaves*. They marry the firſt, hire the ſecond, and buy the third. See TURKEY.

The people in Java marry and have children at nine or ten years old, and the women leave child-bearing before they are thirty; and at Tonquin there are women common to any that will hire them, at eight or nine years of age. See JAVA and TONQUIN.

Among the Hindoos polygamy is practiſed, but one wife is acknowledged as ſupreme. The ceremony of marriage is accompanied with many idolatrous forms. For an account of the ſingular mode of courtſhip and marriage ceremony in *New* HOLLAND, ſee that article.

In Ruſſia, when a marriage is propoſed, the lover, accompanied by a friend, goes to the houſe of the bride, and ſays to her mother, "Shew us your merchandiſe, we have got money;" referring, probably by this expreſſion, to the ancient cuſtom of buying a wife. The other ceremonies are equally curious. See RUSSIA.

Among the Perſians, marriages are conducted by female mediation; and the pomp and ceremonies ſomewhat reſemble the Ruſſian. Polygamy is allowed, but the firſt married is the chief wife. See PERSIA.

In Siam, the eſpouſals are concluded by female mediation. On the third viſit the parties are conſidered as wedded, after the exchange of a few preſents, and without any further ceremony, civil or ſacred. Although polygamy is allowed, more from oſtentation than from any other motive, one wife is always acknowledged as ſupreme. From pride the royal marriages are ſometimes inceſtuous, and the king does not heſitate to eſpouſe his own ſiſter. (See SIAM.) The celebration of marriage in Sumatra is commonly performed in the balli or village-hall, and is accompanied with dances and ſongs. Polygamy is practiſed, ſeeming to be connected, as Mr. Marſden has obſerved, with the idea of purchaſing a wife, inſtead of receiving a dower with her. See SUMATRA.

For an account of the marriage ceremonies of Thibet, ſee THIBET.

Among all the ſavage nations, whether in Aſia, Africa, or America, the wife is commonly bought by the huſband from her father, or thoſe other relations who have an authority over her; and the concluſion of a bargain for this purpoſe, together with the payment of the price, has, therefore, become the uſual form or ſolemnity in the celebration of their marriages.

Among the Abiponians, the price varies from four horſes down to a bottle of brandy. The Araucans may buy as many wives as they can afford to maintain. See CHILI.

Among the Chineſe, the bride is purchaſed by a preſent to her parents, and is never ſeen by her huſband till after the ceremony. In Circaſſia (which ſee), the bridegroom

pays

pays for his bride a marriage present, or "kalym," consisting of arms or a coat of mail; but he must not see her, nor cohabit with her, without the greatest mystery. That reserve continues during life. The father makes the bride a present on the wedding-day, but reserves the greater part of what he intends to give her till the birth of her first child. On this occasion she pays him a visit, receives from him the remainder of her portion, and is clothed by him in the dress of a matron, of which the principal distinction is a veil.

The Hebrews also purchased their wives, by paying down a competent dowry for them: and Aristotle makes it one argument to prove that the ancient Grecians were an uncivilized people, because they used to buy their wives: and in proportion as they laid aside their barbarous manners, they left off this practice.

The ancient Assyrians sold their beauties by an annual auction. The prices were applied by way of portion to the more homely. By this contrivance, all of both sorts were disposed of in marriage. Among the old inhabitants of Germany, as well as the Jewish patriarchs, and the Grecians, the husband paid money to the family of the wife, whereas now the wife brings money to her husband. This alteration, says Paley, has proved of no small advantage to the female sex, for their importance in point of fortune procures for them, in modern times, that assiduity and respect which are always wanted to compensate for the inferiority of their strength, but which their personal attractions would not always secure.

The English law considers marriage in no other light than as a civil contract: the holiness of the matrimonial state being left entirely to the ecclesiastical law, to which it pertains to punish or annul incestuous or other unscriptural marriages. The law allows marriage to be good and valid, where the parties at the time of making it were willing and able to contract, and actually did contract, in the proper forms and solemnities required by law. As to their being willing to contract, "consensus, non concubitus, facit nuptias," is the maxim of the civil law in this case; and it is adopted by the common lawyers. (Co. Litt. 33.) The disabilities or incapacities for contracting are of two sorts: first, such as are canonical, and, therefore, sufficient by the ecclesiastical laws to avoid the marriage in the spiritual court; such as pre-contract, consanguinity, or relation by blood; and affinity, or relation by marriage, and some particular corporeal infirmities. But these disabilities in our law do not make the marriage *ipso facto* void, but voidable only by sentence of separation; and marriages are esteemed valid to all civil purposes, unless such separation is actually made during the life of the parties. Thus, when a man had married his first wife's sister, and after her death the bishop's court was proceeding to annul the marriage, and bastardize the issue, the court of king's bench granted a prohibition *quoad hoc;* but permitted them to proceed to punish the husband for incest. Salk. 548.

By 32 Hen. VIII. c. 38. it is declared, that all persons may lawfully marry, but such as are prohibited by God's law, &c. And that nothing (God's law excepted) shall impeach any marriage but within the Levitical degrees: these are enumerated in the eighteenth chapter of Leviticus, and are illustrated by lord Coke in this manner: a man may not marry his mother, father's sister, mother's sister, sister, daughter, daughter of his son or daughter, father's wife, uncle's wife, father's wife's daughter, brother's wife, wife's sister, son's wife or wife's daughter, and daughter of his wife's son or daughter. And a woman may not marry her father, father's brother, mother's brother, brother, son of her son or daughter, mother's husband, aunt's husband, sister's husband, husband's brother, and son of her husband's son or daughter. Accordingly, a table was set forth in the year 1563, specifying at large the prohibited degrees. It is observed, that the degrees prohibited by the Levitical law are all within the fourth degree of consanguinity, as established by the computation of the civilians; all collaterals, therefore, in that degree, or beyond it, may marry. By the civil law first cousins are allowed to marry; but by the canon law both first and second cousins are prohibited. Therefore, when it is vulgarly said, that first cousins may marry, but second cousins cannot, this probably arose by confounding these two laws; for first cousins may marry by the civil law, and second cousins cannot by the canon law. But by the foresaid stat. 32 Henry VIII. c. 38, it is clear that both first and second cousins may marry. By the same statute all impediments arising from pre-contracts to other persons were abolished, and declared of none effect, unless they had been consummated with bodily knowledge; in which case the canon law holds such contract to be a marriage *de facto*. But this branch of the statute was repealed by 2 and 3 Ed. VI. c. 23. How far the act of 26 Geo. II. c. 33. (which prohibits all suits in ecclesiastical courts to compel a marriage, in consequence of any contract) may collaterally extend to revive this clause of Henry VIII.th's statute, and abolish the impediment of pre-contract, judge Blackstone leaves to be considered by the canonists. We shall here observe, that on a promise of marriage, if it be mutual on both sides, damages may be recovered, in case either party refuses to marry; and though no time for the marriage is agreed on, if the plaintiff avers that he offered to marry the defendant, who refused it, an action is maintainable for the damages; but no action shall be brought upon any agreement except it is in writing, and signed by the party to be charged. The canonical hours for celebrating marriage are from eight till twelve in the forenoon.

Disabilities of another sort are those which are created, or at least enforced, by the municipal laws. These civil disabilities make the contract void *ab initio*, and not merely voidable, by rendering the parties incapable of forming any contract at all. The first legal disability is a prior marriage, or having another husband or wife living; in which case, besides the penalties consequent upon it as a felony, the second marriage is to all intents and purposes void. See BIGAMY, and POLYGAMY.

The next legal disability is want of age: therefore, if a boy under fourteen, or a girl under twelve years of age, marries, when either of them comes to the age of consent they may disagree, and declare the marriage void, without any divorce or sentence in the spiritual court. This is founded on the civil law: but the canon law pays a greater regard to the constitution than the age of the parties; for if they are "habiles ad matrimonium," it is a good marriage, whatever their age may be. And in our law it is so far a marriage, that, if at the age of consent they agree to continue together, they need not be married again. (Co. Litt. 79.) If the husband be of years of discretion, and the wife under twelve, when she comes to years of discretion he may disagree as well as she may; for in contracts the obligation must be mutual; both must be bound or neither: and so it is, *vice versa*, when the wife is of years of discretion, and the husband under. (Ibid.) However, in our law it is so far a marriage, that if at the age of consent they agree to continue together, they need not be married again. Another incapacity arises from want of consent of parents or guardians. By the common law, if the parties themselves were of the age of consent, no other concurrence was necessary to make the marriage valid; and this was agreeable to the canon law. But by several statutes

ſtatutes, *viz.* 6 and 7 W. III. c. 6. 7 and 8 W III. c. 35. 10 Ann. c. 19. penalties of 100*l.* are laid on every clergyman who marries a couple, either without publication of banns, which may give notice to parents or guardians, or without a licence, to obtain which the conſent of parents or guardians muſt be ſworn to. And by 4 and 5 Ph. and M. c. 8. whoſoever marries any woman-child under the age of ſixteen years, without conſent of parents or guardians, ſhall be ſubject to fine, or five years impriſonment; and her eſtate, during the huſband's life, ſhall be enjoyed by the next heir. Thus alſo in France, under the old conſtitution, the ſons cannot marry without conſent of parents till thirty years of age, nor the daughters till twenty-five; and in Holland, the ſons are at their own diſpoſal at twenty-five, and the daughters at twenty. And by the marriage act, *viz.* 26 Geo. II. c. 33, it is enacted, that all marriages celebrated by licence (for banns ſuppoſe notice) where either of the parties is under twenty-one, not being a widow or widower, who are ſuppoſed emancipated, without the conſent of the father, or, if he be not living, of the mother or guardians, ſhall be abſolutely void. However, proviſion is made, where the mother or guardian is non compos, beyond ſea, or unreaſonably froward, to diſpenſe with ſuch conſent, at the diſcretion of the lord chancellor; but no proviſion is made, in caſe the father ſhould labour under any mental, or other incapacity. A fourth incapacity is want of reaſon. It is provided by 15 Geo. II. cap. 30. that the marriage of lunatics, and perſons under phrenzies (if found lunatics under a commiſſion, or committed to the care of truſtees by any act of parliament) before they are declared of ſound mind by the lord chancellor, or the majority of ſuch truſtees, ſhall be totally void.

By the ancient law of England, if any Chriſtian man did marry with a woman that was a Jew, or a Chriſtian woman did marry with a Jew, it was felony, and the party ſo offending ſhould be burnt alive (3 Inſt. 89); or as the author of Fleta ſays, buried alive. But when both parties are Jews, they are allowed to marry; and are not under the reſtraints of the ſtatute of 26 Geo. II. c. 33. By the civil law the woman is forbidden to marry again within the year of mourning, unleſs with a ſpecial diſpenſation from the prince; by reaſon of the uncertainty to which huſband the iſſue may belong, and becauſe a reverential mourning and pious regard to the memory of her deceaſed huſband, are in decency expected. (Wood. Civ. L. 124. 2 Domat. 126.) And lord Coke ſays, for the avoiding of ſuch like inconveniences, this was the law before the conqueſt; let every widow continue unmarried for twelve months; and if ſhe ſhall marry, let her loſe her dower. (1 Inſt. 8.) But the divine and the canon law leaves no ſuch injunctions. (Wood. Civ. L. 122.) Alſo, by the common law of England, a widow is not prohibited from marrying at any time after her huſband's death. If a woman marry ſo ſoon after the death of her huſband that the child may belong to either father, it is ſaid the child may chooſe his father. Co. Litt. 8 *a*.

Laſtly, the parties muſt not only be willing and able to contract, but muſt actually contract themſelves in due form of law, to make it a good civil marriage. Any contract made, *per verba de præſenti*, or in words of the preſent tenſe, and in caſe of cohabitation *per verba de futuro* alſo, between perſons able to contract, was before the marriage act deemed a valid marriage to many purpoſes, and the parties might be compelled in the ſpiritual courts to celebrate it *in facie eccleſiæ*. But theſe verbal contracts are now of no force, to compel a future marriage. Nor is any marriage at preſent valid that is not celebrated in ſome pariſh-church or public chapel, unleſs by diſpenſation from the archbiſhop of Canterbury. It muſt alſo be preceded by publication of banns, or by licence from the ſpiritual judge. No parſon, vicar, &c. ſhall be obliged to publiſh banns of matrimony, unleſs the perſons to be married ſhall, ſeven days before the time required for the firſt publication, deliver to him a notice in writing of their true names, and of the houſe or houſes of their reſpective abode, within ſuch pariſh, &c. and of the time that they have dwelt in ſuch houſe or houſes. And the ſaid banns ſhall be publiſhed upon three Sundays preceding the ſolemnization of marriage, during the time of public ſervice. In caſe the parents or guardians of either of the parties, who ſhall be under the age of twenty-one years, ſhall openly and publicly declare, or cauſe to be declared in the church or chapel, where the banns ſhall be ſo publiſhed, at the time of ſuch publication, their diſſent to ſuch marriage, ſuch publication of banns ſhall be void. And when the parties dwell in divers pariſhes, the curate of the one pariſh ſhall not ſolemnize matrimony betwixt them, without a certificate of the banns being thrice aſked, from the curate of the other pariſh. In all caſes where banns have been publiſhed, the marriage ſhall be ſolemnized in one of the pariſh churches or chapels where ſuch banns have been publiſhed, and in no other place. A marriage in purſuance of a licence (except a ſpecial licence) muſt be ſolemnized in ſuch church or chapel where the licence is granted; and no licence of marriage ſhall be granted by any archbiſhop, biſhop, &c. to ſolemnize any marriage in any other church, &c. than in the pariſh church, &c. within which the uſual place of abode of one of the parties ſhall have been for four weeks immediately before the granting ſuch licence. By the ſame ſtatute, all marriages ſhall be ſolemnized in the preſence of two credible witneſſes at the leaſt, beſides the miniſter, who ſhall ſign their atteſtation thereof; and immediately after the celebration of every marriage, an entry thereof ſhall be made in the pariſh-regiſter, expreſſing that the ſaid marriage was celebrated by banns or licence; and if both or either of the parties be under age, with conſent of the parents or guardians, as the caſe ſhall be, ſigned by the miniſter, and alſo by the parties married, and atteſted by the two witneſſes preſent. It is held to be alſo eſſential to a marriage, that it be performed by a perſon in orders (Salk. 119.); though the intervention of a prieſt to ſolemnize this contract is merely *juris poſitivi*, and not *juris naturalis aut divini*; it being ſaid that pope Innocent III. was the firſt who ordained the celebration of marriage in the church (Moor. 170.), before which it was totally a civil contract. And in the times of the grand rebellion, all marriages were performed by the juſtices of the peace; and theſe marriages were declared valid, without any freſh ſolemnization, by 12 Car. II. c. 33. But as the law now ſtands, we may upon the whole collect, that no marriage by the temporal law is *ipſo facto* void, that is celebrated by a perſon in orders; in a pariſh-church, a public chapel, or elſewhere by ſpecial diſpenſation; in purſuance of banns or a licence; between ſingle perſons; conſenting; of ſound mind; and of the age of twenty-one years; or of the age of fourteen in males, and twelve in females, with conſent of parents or guardians, or without it in caſe of widowhood. And no marriage is voidable by the eccleſiaſtical law, after the death of either of the parties; nor during their lives, unleſs for the canonical impediments of precontract, if that indeed ſtill exiſts; of conſanguinity, and of affinity, or corporal imbecility, ſubſiſting previous to the marriage. Blackſt. Com. vol. i.

 By

By 26 Geo. II. c. 33. the fubftance of which has been already recited, if any perfon fhall folemnize matrimony in any other place than a church, &c. where banns have been ufually publifhed, unlefs by a fpecial licence, or without publication of banns, unlefs licence of marriage be firft obtained from fome perfon having authority to grant the fame, every fuch perfon knowingly fo offending, fhall be guilty of felony, and tranfported for fourteen years; the profecution to be within three years. By the fame ftatute, to make a falfe entry into a marriage-regifter; to alter it when made; to forge or counterfeit fuch entry, or a marriage licence, or aid and abet fuch forgery, to utter the fame as true, knowing it to be counterfeit; or to deftroy or procure the deftruction of any regifter, in order to vacate any marriage, or fubject any perfon to the penalties of this act: all thefe offences, knowingly and wilfully committed, fubject the party to the guilt of felony without benefit of clergy. But this act doth not extend to the marriages of the royal family; nor to Scotland; nor to any marriages among the people called Quakers, or among perfons profeffing the Jewifh religion, where both the parties are Quakers or Jews refpectively; nor to any marriages beyond the feas.

As the paffage into Scotland is left open by the marriage act, many perfons have found their way thither to be married, in a clandeftine and irregular manner; and there has been a diverfity of opinions concerning the validity of fuch marriages. Lord Stair, in his "Inftitutions of the Laws of Scotland," fays, the public folemnity of marriage is a matter of order. juftly introduced by pofitive law, for the certainty of fo important a contract; but not effential to marriage. Thence arifes the diftinction of public or folemn, and private or clandeftine marriages. And though perfons, who act contrary thereto, may be juftly punifhed, (as in fome nations by the exclufion of the iffue of fuch marriages from fucceffion,) yet the marriage cannot be declared void and annulled; and fuch exclufions feem very unequal againft the innocent children. But by the cuftom of Scotland, cohabitation, and being commonly reputed man and wife, validate the marriage, give the wife a right to her thirds, who cannot be excluded therefrom, if fhe was reputed lawful wife, and not queftioned during the hufband's life, till the contrary be clearly proved. Mr. Erfkine, in his "Principles of the Law of Scotland," fays, it is not neceffary that marriage be celebrated by a clergyman: the confent of parties may be declared before any magiftrate, or fimply before witneffes. When the order of the church is obferved, the marriage is called regular; when otherwife, clandeftine. Towards a regular marriage, the church requires proclamation of banns in the churches, where the bride and bridegroom refide: formerly, not only bifhops, but prefbyteries, affumed a power of difpenfing with proclamation of banns, on extraordinary occafions; but this hath not been exercifed fince the revolution But whether clandeftine marriages in Scotland, of Englifh parties, who refort thither to evade the Englifh law, fhall be fuftained in England, hath been doubted; and very learned men have queftioned, notwithftanding fuch marriages are valid by the law of Scotland, whether they are effective in England. Where parties are bound, by the laws of their country, to execute any important act or contract with certain folemnities; it is doubted whether they can elude their own law, by going purpofely to another country, where fuch folemnities are not effential, and then returning immediately, when the act is done. It is a queftion of public law; and the moft celebrated writers on public law have holden, that fuch an act is fraudulent: it is *fraudem facere lege*, which the laws of all nations difallow. In a cafe that occurs in "Buller's Law of Nifi Prius," an appeal was made to the delegates: the appellant and refpondent both Englifh fubjects, the appellant, being under age, ran away without the confent of her guardian, and were married in Scotland; and on a fuit brought in the fpiritual court to annul the marriage, it was holden that the marriage was good.

So, it has been fince taken as an undoubted propofition, that a marriage celebrated in Scotland is fuch a marriage as would entitle the woman to dower in England.

By 35 Geo. III. c. 67. after reciting that the punifhment of perfons convicted of felony by virtue of 1 Jac. I. c. 11. "for reftraining perfons from marriage until their former wives or hufbands be dead," has not proved effectual to deter wicked perfons from being guilty of the faid offence, it is enacted, that if any perfon being married, or who hereafter fhall marry, do, after the 15th of May 1795, marry any perfon, the former hufband or wife being alive, and fhall be in due manner convicted thereof under the faid act, fhall be fubject and liable to the fame penalties, pains, and punifhments, as by the laws now in force perfons are liable to, who are convicted of grand or petit larceny.

For the proportions which marriages bear to births, and births to burials, in feveral parts of Europe, Mr. Derham gives us the following table:

Names of Places.	Marriages to Births, as	Births to Burials, as
England in general	1 to 4.63	1.12 to 1
London	1 to 4	1 to 1.1
Hantfhire, from 1569 to 1658	1 to 4	1.2 to 1
Tiverton in Devonfhire, from 1656 to 1664	1 to 3.7	1.26 to 1
Cranbrook in Kent, from 1560 to 1649	1 to 3.9	1.6 to 1
Aynho in Northamptonfhire, for 118 years	1 to 6	1.6 to 1
Upminfter in Effex, for 100 years	1 to 4.6	1.8 to 1
Frankfort on the Maine, in 1695	1 to 3.7	1.2 to 1
Old, Middle, and Lower Marck, in 1698	1 to 3.7	1.9 to 1
Dominions of the Elector of Brandenburgh, in 1698	1 to 3.7	1.5 to 1
Breflaw in Silefia, from 1687 to 1691	———	1.6 to 1
Paris, in 1670, 1671, 1672	1 to 4.7	1.6 to 1

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The Editor has formed the following Table, fimilar to the preceding, from the obfervations collected and referred to by Dr. Price.

Names of Places.	Marriages to Births, as	Births to Burials, as
London, annual medium from 1716 to 1736	———	18000 to 26529, or 1 to 1.4, &c.
——— from 1759 to 1768	———	15710 to 22956, or 1 to 1.4, &c.
Northampton, ditto, from 1741 to 1770	———	155 to 191, or 1 to 1.2, &c.
Norwich, ditto, from 1740 to 1769	———	1057 chriftenings to 1206, or 1 to 1.1, &c.
Shrewfbury, ditto, from 1762 to 1768	———	301 to 329 or 1 to 1.09, &c.
Manchefter and Salford, exclufive of Diffenters, ditto, from 1755 to 1759	———	756 to 743.
Ditto, ditto, including Diffenters, from 1768 to 1772	———	1098 to 958, or 1.14, &c. to 1.
Gainfborough in Lincolnfhire, ditto, from 1752 to 1771	1 to 3.7	126 to 105, or 1.2 to 1.
Madeira, ditto, from 1759 to 1766	1 to 4.88	2201 to 1203, or 1.7 to 1.
Bofton in New England, from 1731 to 1752	———	538 to 608, or 1 to 1.13, &c.
Chriftiana in Norway, in 1761	———	11024 to 6929, or 1.5 to 1.
Paris, mean of fome of the laft years, before 1772	1 to 4.3	19100 to 19400, or 1 to 1.01, &c.
Vienna, annual medium, from 1757 to 1769	———	5800 to 6600, or 1 to 1.1, &c.
Amfterdam, ditto, from 1761 to 1770	1 to 1.9, &c.	4600 to 7922 or 1 to 1.7, &c.
Copenhagen, ditto	1 to 3.04, &c.	2700 to 3300, or 1 to 1.2, &c.
Stockholm, ditto, for nine years, ending in 1763	———	2535 to 3781.
Berlin, ditto, for five years, ending at 1759	1 to 3.9, &c.	3855 to 5054, or 1 to 1.3, &c.
Breflaw, ditto, from 1633 to 1734	———	1089 to 1256, or 1 to 1.15, &c.
———, ditto, from 1717 to 1725	———	1252 to 1507, or 1 to 1.2, &c.
Rome, ditto, from 1759 to 1761	———	5167 to 7153, or 1 to 1.3, &c.
Vaud, in Switzerland, ditto, for ten years before 1766	1 to 3.9	3155 to 2504, or 1.2, &c. to 1.
In all Sweden, for nine years to 1763	———	130 to 100.
In the kingdom of Naples, for five years to 1777	———	144 to 100.
In all France, for five years to 1774	———	117 to 100.
In Breflaw, Glogaw, and other towns of Silefia, for four years to 1778	10 to 45	996 to 1000.
In the country parifhes and villages of Silefia, ditto	10 to 45	125 to 100.
In the kingdom of Pruffia and dukedom of Lithuania, ten years to 1702	10 to 37	150 to 100.
five years to 1716	10 to 39	180 to 100.
five years to 1756	10 to 50	148 to 100.
In the Churmark of Brandenburgh, five years to 1702	10 to 37	176 to 100.
———, four years to 1756	10 to 38	124 to 100.
In the duchy of Pomerania, fix years to 1702	10 to 36	140 to 100.
———, fix years to 1706	10 to 39	177 to 100.
———, fix years to 1726	10 to 39	150 to 100.
———, four years to 1756	10 to 43	137 to 100:
In the Neumark of Brandenburgh, five years to 1701	10 to 37	155 to 100.
———, five years to 1726	10 to 40	164 to 100.
———, five years to 1756	10 to 42	143 to 100.
In the dukedom of Magdeburg, five years to 1702	10 to 38	156 to 100.
———, five years to 1717	10 to 36	142 to 100.
———, five years to 1756	10 to 40	109 to 100.
In the duchy of Halberftadt, four years to 1692	10 to 39	160 to 100.
———, five years to 1746	10 to 38	136 to 100.
———, fix years to 1756	10 to 37	111 to 100.
In the duchy of Ravenfburg, five years to 1692	10 to 40	152 to 100.
———, four years to 1756	10 to 36	132 to 100.
In the dukedom of Cleve and county of Mark, four years to 1701	10 to 36	151 to 100.
five years to 1739	10 to 42	134 to 100.
four years to 1756	10 to 38	136 to 100.

Names of Places.	Marriages to Births, as	Births to Burials, as
In the Auftrian Milanefe, 1769-1773-1774 - - -	10 to 45	110 to 100.
In Denmark, five years to 1747 - - - -	———	121 to 100.
———, five years to 1756 - - - -	———	112 to 100.
In Norway, five years to 1747 - - - - -	———	160 to 100.
———, fourteen years to 1756 - - - -	———	136 to 100.
In 1056 country parifhes and villages in the churmark of Brandenburg, confifting in 1748 of 106,204 males and 107,540 females, ten years to 1748 - - -	10 to 36	127 to 100.
In 7 market-towns and 54 country parifhes in England, confifting in 1740 of 10,434 families and 46,650 inhabitants, in 1748 - - - - - - -	10 to 40	115 to 100.

For an account of the numbers of male and female ftillborn children and chryfoms, and of boys and girls under ten, of married men and married women, and of widows and widowers, who died for a courfe of years at Vienna, Breflaw, Drefden, Leipfic, Ratifbon, and fome other towns in Germany, fee Phil. Tranf. Abr. vol. vii. part iv. p. 46, &c.

The reader may find many curious calculations and remarks relating to this fubject in Dr. Price's excellent work, entitled "Obfervations on Reverfionary Payments." From the preceding table it appears, that marriages, one with another, do each produce about four births, both in England, and other parts of Europe. Dr. Price obferves, that the births at Paris, as may be feen in the table, are above four times the weddings; and therefore it may feem, that in the moft healthy country fituations, every wedding produces above four children; and though this be the cafe in Paris, for reafons which he has given, he has obferved nothing like it in any other great town. He adds, that from comparing the births and weddings, in countries and towns where regifters of them have been kept, it appears, that in the former, marriages, one with another, feldom produce lefs than four children each; generally between four and five, and fometimes above five: but in towns feldom above four, generally between three and four, and fometimes under three. It is neceffary to be obferved here, that though the proportion of annual births to weddings has been confidered as giving the true number of children derived from each marriage, taking all marriages one with another; yet this is only true, when, for many years, the births and burials have kept nearly equal. Where there is an excefs of the births occafioning an increafe, the proportion of annual births to weddings muft be lefs than the proportion of children derived from each marriage; and the contrary muft take place, where there is a decreafe; and by Mr. King's computation, about one in an hundred and four perfons marry; the number of people in England being eftimated at five millions and a half, whereof about forty-one thoufand annually marry.

In the diftrict of Vaud in Switzerland, the married are very nearly a third part of the inhabitants.

Major Graunt and Mr. King difagree in the proportions between males and females, the latter making ten males to thirteen females in London; in other cities and towns, and in the villages and hamlets, a hundred males to ninety-nine females; but major Graunt, both from the London and country bills, computes that there are in England fourteen males to thirteen females; whence he juftly infers, that the Chriftian religion, prohibiting polygamy, is more agreeable to the law of nature than Mahometanifm, and others that allow it.

This proportion of males to females Mr. Derham thinks pretty juft, being agreeable to what he had obferved himfelf. In the hundred years, for inftance, of his own parifh-regifter of Upminfter, though the burials of males and females were nearly equal, being fix hundred and thirty-three males, and fix hundred and twenty-three females, in all that time; yet there were baptized feven hundred and nine males, and but fix hundred and feventy-five females, which is 13 females to 13.7 males. From a table formed by Dr. Price, he concludes that this proportion fhould have been ftated at 19 to 20.

From a regifter kept at Northampton for twenty-eight years, from 174 to 1770, it appears, that the proportion of males to females that were born in that period is 2361 to 2288, or nearly 13.4 to 13. However, though more males are born than females, Dr. Price has fufficiently fhewn, that there is a confiderable difference between the probabilities of life among males and females, in favour of the latter; fo that males are more fhort-lived than females; and as the greater mortality of males takes place among children, as well as among males at all ages, the fact cannot be accounted for merely by their being more fubject to untimely deaths by various accidents, and by their being addicted to the exceffes and irregularities which fhorten life. Mr. Kerfleboom informs us, that, during the courfe of 125 years in Holland, females have, in all accidents of age, lived about three or four years longer than the fame number of males. In feveral towns of Germany, &c. it appears, that of 7270 married perfons who had died, the proportion of married men who died to the married women, was 3 to 2; and in Breflaw for eight years, as 5 to 3. In all Pomerania, during nine years, from 1748 to 1756, this proportion was nearly 15 to 11. Among the minifters and profeffors in Scotland, twenty married men die to twelve married women, at a medium of twenty-feven years, or in the proportion of 5 to 3; fo that there is the chance of 3 to 2, and in fome circumftances even a greater chance, that the woman fhall be the furvivor of a marriage, and not a man; and this difference cannot be accounted for merely by the difference of age between men and their wives, without admitting the greater mortality of males. In the diftrict of Vaud in Switzerland, it appears, that half the females do not die till the age of forty-fix and upwards, though half the males die under thirty-fix. It is likewife an indifputable fact, that, in the beginning of life, the rate of mortality among males is much greater than among females.

From

From a table formed by Dr. Price, from a regifter kept for twenty years at Gainfborough, it appears, that of thofe who live to eighty, the major part, in the proportion of 49 to 32, are females. Mr. Deparcieux at Paris, and Mr. Wargentin in Sweden, have further obferved, that not only women live longer than men, but that married women live longer than fingle women. From fome regifters examined by Mr. Muret in Switzerland, it appears, that of equal numbers of fingle and married women between fifteen and twenty-five, more of the former died than of the latter, in the proportion of 2 to 1. With refpect to the difference between the mortality of males and females, it is found to be much lefs in country parifhes and villages than in towns; and hence it is inferred, that human life in males is more brittle than in females, only in confequence of adventitious caufes, or of fome particular debility, that takes place in polifhed and luxurious focieties, and efpecially in great towns.

From the inequality, above ftated, between the males and females that are born, it is reafonable to infer, that one man ought to have but one wife; and yet that every woman, without polygamy, may have a hufband; this furplufage of males above females being fpent in the fupplies of war, the feas, &c. from which the women are exempt. Perhaps, fays Dr. Price, it might have been obferved with more reafon, that this provifion had in view that particular weaknefs or delicacy in the conftitution of males, which makes them more fubject to mortality; and which confequently renders it neceffary that more of them fhould be produced, in order to preferve in the world a due proportion between the two fexes. See EXPECTATION *of life*, and MORTALITY.

That this is a work of Providence, and not of chance, is well made out by the very laws of chance, by Dr. Arbuthnot; who fuppofes Thomas to lay againft John, that for eighty-two years running, more males fhall be born than females; and, giving all allowances in the computation to Thomas's fide, he makes the odds againft Thomas, that it does not fo happen, to be near five millions of millions of millions of millions to one; bu for ages of ages, according to the world's age, to be near an infinite number to one.

According to Mr. Kerffeboom's obfervations, there are about 325 children born from 100 marriages.

Mr. Kerffeboom, from his obfervations, eftimates the duration of marriages, one with another, as in the following table:

Thofe whofe ages, taken together, make

40 live together between	24	and 25	years.
50	22	23	
60	23	21	
70	19	20	
80	17	18	
90	14	15	
100	12	13	

Phil. Tranf. N° 468. fect. iii. p. 319.

Dr. Price has fhewn, that on De Moivre's hypothefis, or that the probabilities of life decreafe uniformly (fee COMPLEMENT *of life*) the duration of furvivorfhip is equal to the duration of marriage, when the ages are equal; or, in other words, that the expectation of two joint lives, the ages being equal, is the fame with the expectation of furvivorfhip; and, confequently, the number of furvivors, or (which is the fame, fuppofing no fecond marriages) of widows and widowers, alive together, which will arife from any given fet of fuch marriages conftantly kept up, will be equal to the whole number of marriages; or half of them (the number of widows in particular) equal to half the number of marriages. Thus, the expectation of two joint lives, both 40, is the third of 46 years, or their complement, *i. e.* 15 years and 4 months; and this is alfo the expectation of the furvivor. That is, fuppofing a fet of marriages, between perfons all 40, they will, one with another, laft juft this time, and the furvivors will laft the fame time. In adding together the years which any great number of fuch marriages, and their furvivorfhips, have lafted, the fums would be found to be equal. It is obferved farther, that if the number expreffing the expectation of fingle or joint lives, multiplied by the number of fingle or joint lives whofe expectation it is, be added annually to a fociety or town, the fum gives the whole number living together, to which fuch an annual addition would in time grow: thus, fince 19, or the third of 57, is the expectation of two joint lives, whofe common age is 29, or common complement 57, twenty marriages every year between perfons of this age would, in fifty-feven years, grow to 20 times 19, or 380 marriages always exifting together. The number of furvivors alfo arifing from thefe marriages, and always living together, would, in twice 57 years, increafe to the fame number. Moreover, the particular proportion that becomes extinct every year, out of the whole number conftantly exifting together of fingle or joint lives, muft, wherever this number undergoes no variation, be exactly the fame with the expectation of thofe lives, at the time when their exiftence commenced. Thus, if it were found that a nineteenth part of all the marriages among any body of men, whofe numbers do not vary, are diffolved every year by the deaths of either the hufband or wife, it would appear, that 19 was, at the time they were contracted, the expectation of thefe marriages. Dr. Price obferves, that the annual average of weddings among the minifters and profeffors in Scotland, for the laft twenty-feven years, has been thirty-one; and the average of married perfons, for feventeen years, ending in 1767, had been 667. This number, divided by 31, gives $21\frac{1}{2}$, the expectation of marriage among them; which, he fays, is above $2\frac{1}{2}$ years more than the expectation of marriage would be, by Dr. Halley's table, on the fuppofition, that all firft, fecond, and third marriages may be juftly confidered as commencing, one with another, fo early as the age of thirty; and he has proved, that the expectation of two equal joint lives is to the expectation of a fingle life of the fame age as 2 to 3: confequently, the expectation of a fingle life at 30, among the minifters in Scotland, cannot be lefs than 32.25. If we fuppofe the mean ages, of all who marry annually to be 33 and 25, the expectation of every marriage would be 19 years; or one with another they would be all extinct in 19 years; the marriages which continue beyond this term, though fewer in number, enjoying among them juft as much more duration, as thofe that fall fhort of it enjoy lefs. But it appears from the obfervations and tables of Mr. Muret, that, in the diftrict of Vaud (dividing half the number of married perfons, *viz.* 38.328. by the annual medium of weddings, *viz.* 808) the expectation of marriage is only $23\frac{1}{2}$ years: fo much higher are the probabilities of life in the country than in towns, or than they ought to be, according to De Moivre's hypothefis. Price's Obf. &c. See EXPECTATION *of life*, LIFE-*annuities*, and SURVIVORSHIP.

MARRIAGE, in *Chivalry*. See MARITAGIUM.

MARRIAGE, *Certificate of*. By 5 W. c. 21 and 38 Geo. III. c. 149: for every piece of vellum, parchment, or paper, upon which any certificate of marriage (except of the marriage of a feaman's widow) fhall be ingroffed or written, fhall be paid a ftamp duty of 5*s.*; and writing fuch certificate upon the fame before it be ftamped incurs a forfeiture of 5*l.*

MARRIAGE, *Clandeftine* or *Irregular*. See MARRIAGE, *fupra*.

MARRIAGE, *Contract of*. See CONTRACT, and MARRIAGE, *supra*.

This contract formerly furnished one species of matrimonial causes, in which a party contracted to another brought a suit in the ecclesiastical court to compel a celebration of the marriage, in pursuance of such contract; but this branch of causes is now cut off entirely by the act for preventing clandestine marriages, 26 Geo. II. c. 33, which enacts that for the future no suit shall be had in any ecclesiastical court, to compel a celebration of marriage in *facie ecclesiæ*, for or because of any contract of matrimony whatsoever.

MARRIAGE, *Dissolution of*. See DIVORCE.

MARRIAGE, *Duty of*, is a term used in some ancient customs, signifying an obligation on women to marry.

To understand this, it must be observed, that old maids, and widows about sixty, who held fees in body, or were charged with any personal or military services, were anciently obliged to marry, to render those services to the lord by their husbands, or to indemnify the lord for what they could not do in person. And this was called *duty* or *service of marriage*.

MARRIAGE, *Forcible*. See FORCIBLE *Marriage*.

MARRIAGE, *Frank*. See FRANK.

MARRIAGE, *Jactitation of*, in *Law*, is one of the first and principal matrimonial causes, when one of the parties boasts or gives out, that he or she is married to the other, whereby a common reputation of their matrimony may ensue. On this ground the party injured may libel the other in the spiritual court; and unless the defendant undertakes and makes out a proof of the actual marriage, he or she is enjoined perpetual silence on that head; which is the only remedy the ecclesiastical courts can give for this injury. Blackst. Com. vol. ii.

Dr. Godolphin says, that marriage was at first tried in the temporal courts; but afterwards, by the concession of princes, such causes were determined in the spiritual courts. The reasons why the cognizance thereof hath been permitted to the ecclesiastical judge are divers: especially because matrimony was heretofore a sacrament of the church; and the office being performed by clergymen, this of consequence brings the performance under the diocesan's inspection; and in the case of the Levitical degrees in particular, ecclesiastics are presumed to be the best judges of what is prohibited by God's law. The lawfulness of marriage is to be tried by the bishop's certificate (see CERTIFICATE), upon an issue "accoupled in lawful matrimony or not;" as in a writ of dower, appeal, bastardy, or the like. (1 Inst. 134.) And the bishop's certificate in this case is conclusive against all the world, and is the only mode of trying the issue on the plea of "ne unques accouple in loial matrimonie;" for to such a plea a mere *sentence* in the ecclesiastical court is not a good replication, because that would be to plead evidence, which, if it is any thing, amounts to the general issue, contrary to the rule (see 4 Bac. Abr. 60.), and to bind the court by what does not bind the bishop, who, if he see cause, may revoke the sentence. But such a sentenc, unrepealed and unappealed from, is evidence to a jury; and may be pleaded in chancery. Whether a woman is a feme covert, or whether she is the wife of such a person, is triable by a jury upon the above-mentioned issue. Therefore a marriage *de facto*, or in reputation (as amongst the Quakers) hath been allowed by the temporal courts to be sufficient for giving title to a personal estate, because the lawfulness of the marriage is not in issue, or the point to be tried. For the issue is whether a marriage was contracted between the parties or not, or whether the parties lived in a married state where the legality of it doth not come in question. Wood. b. i. c. 6.

In the act of 6 and 7 W. c. 6. laying a duty upon marriages, Quakers and Jews, cohabiting as man and wife, were required to pay the said duty, although not married "according to the law of England;" and there was a proviso, that nothing therein contained should be construed to make good or effectual in law any such marriage or pretended marriage; but that they should be of the same force, and no other, as if the said act had not been made. But in the act of 26 Geo. II. c. 33. there is no proviso of the like purport; but rather the act proceeds upon a supposition that such marriages are good and valid.

In writs of dower, or other suits brought in the king's temporal courts, if issue be joined upon "not accoupled in lawful matrimony," this being a cause which is merely ecclesiastical, the trial thereof must be by the bishop or ordinary, upon an inquisition taken before him as judge.

The proof of a marriage may be by witnesses who were present at the solemnization; by cohabitation of the parties; by public fame and reputation; by confession of the married persons themselves, although their acknowledgment might only be to avoid the punishment of fornication; and by divers other circumstances; which, if they amount to half-proof, ought to be extended in favour of marriage rather than contrary to it. (Wood Civ. L. 122.) But now, since the 26 Geo. II. c. 33, the register-book seems to be intended as the proper, although not the only evidence in this matter; for if there shall be any doubt as to the identity of the persons, or the like, the register in this respect can be no evidence at all. However, the act does not take away the evidence of presumption from cohabitation; but if the evidence be clear that the marriage was not celebrated according to the requisitions of the act, it is totally void, and no declaratory sentence in the ecclesiastical court is necessary. But in some cases an actual marriage must be proved. See Burn's Eccl. Law. vol. ii art. MARRIAGE.

MARRIAGE, *Proof of* See the preceding article.

MARRIAGE, *Property by*, is a property in goods and chattels acquired by marriage; whereby those chattels, which belonged formerly to the wife, are by act of law vested in the husband, with the same degree of property, and with the same powers, as the wife, when sole, had over them. This depends entirely on the notion of an unity of person between the husband and wife; it being held that they are one person in law; so that the very being and existence of the woman is suspended during the coverture, or entirely merged or incorporated in that of the husband. (See COVERTURE.) Hence it follows, that whatever personal property belonged to the wife before marriage, is, by marriage, absolutely vested in the husband. In a real estate, he only gains a title to the writs and profits during coverture; for that, depending upon feodal principles, remains entire to the wife, after the death of her husband, or to her heirs, if she dies before him; unless, by the birth of a child, he becomes tenant for life by the curtesy. But, in chattel interests, the sole and absolute property vests in the husband, to be disposed of at his pleasure, if he chuses to take possession of them; for unless he reduces them to possession, by exercising some act of ownership upon them, no property vests in him, but they shall remain to the wife, or her representatives, after the coverture is determined.

There is therefore a very considerable difference in the acquisition of this species of property by the husband, according to the subject matter; *viz.* whether it be a chattel *real*, or a chattel *personal*; and, of chattels personal, whether it be in *possession*, or in *action* only. A *chattel real* vests in the husband,

husband, not absolutely, but *sub modo*. As, in case of a lease for years, the husband shall receive all the rents and profits of it, and may, if he pleases, sell, surrender, or dispose of it during the coverture (Co. Litt. 46.): if he be outlawed or attainted, it shall be forfeited to the king (Plowd. 263.); it is liable to execution for his debts (Co. Litt. 351.): and, if he survives his wife, it is to all intents and purposes his own. (Co. Litt. 300.) Yet, if he has made no disposition thereof in his life-time, and dies before his wife, he cannot dispose of it by will (Poph. 5. Co. Litt. 351.): for, the husband having made no alteration in the property during his life, it never was transferred from the wife; but after his death she shall remain in her ancient possession, and it shall not go to his executors. So it is also of chattels personal (or *choses*) in *action;* as debts upon bond, contracts, and the like: these the husband may have if he pleases; that is, if he reduces them into possession by receiving or recovering them at law. And, upon such receipt or recovery, they are absolutely and entirely his own; and shall go to his executors or administrators, or as he shall bequeath them by will, and shall not revest in the wife. But, if he dies before he has recovered or reduced them into possession, so that at his death they still continue *choses in action*, they shall survive to the wife; for the husband never exerted the power he had of obtaining an exclusive property in them. (Co. Litt. 351.) And so, if an estray comes into the wife's franchise, and the husband seises it, it is absolutely his property: but, if he dies without seising it, his executors are not now at liberty to seise it, but the wife or her heirs (Co. Litt. 351.); for the husband never exerted the right he had, which right determined with the coverture. Thus in both these species of property the law is the same, in case the wife survives the husband; but, in case the husband survives the wife, the law is very different with respect to *chattels real* and *choses in action:* for he shall have the *chattel real* by survivorship, but not the *chose in action* (3 Mod. 186.); except in the case of arrears of rent, due to the wife before her coverture, which, in case of her death, are given to the husband by statute 32 Hen. VIII. c. 37. And the reason for the general law is this: that the husband is in absolute possession of the *chattel real* during the coverture, by a kind of joint-tenancy with his wife; wherefore the law will not wrest it out of his hands, and give it to her representatives; though, in case he had died first, it would have survived to the wife, unless he thought proper in his life-time to alter the possession. But a *chose in action* shall not survive to him, because he never was in possession of it at all, during the coverture; and the only method he had to gain possession of it, was by suing in his wife's right: but as, after her death, he cannot (as husband) bring an action in her right, because they are no longer one and the same person in law, therefore he can never (as such) recover the possession. But he still will be entitled to be her administrator; and may, in that capacity, recover such things in action as became due to her before or during the coverture.

Thus, and upon these reasons, stands the law between husband and wife, with regard to *chattels real* and *choses in action:* but as to *chattels personal* (or *choses*) *in possession*, which the wife hath in her own right, as ready money, jewels, household goods, and the like, the husband hath therein an immediate and absolute property, devolved to him by the marriage, not only potentially but in fact, which never can again revest in the wife or her representatives. Co. Litt. 351.

And, as the husband may thus generally acquire a property in all the personal substance of the wife, so in one particular instance the wife may acquire a property in some of her husband's goods; which shall remain to her after his death, and not go to his executors. These are called her *paraphernalia;* which see. Blackst. Com. b. ii.

MARRIAGE *of the Royal Family* is excepted from the act 26 Geo. II. c. 33. (See MARRIAGE.) But by the 12 Geo. III. c. 11. no descendant of his late majesty Geo. II. (other than the issue of princesses married or who may marry into foreign families) shall be capable of contracting matrimony, without the previous consent of his majesty, his heirs, &c. signified under the great seal, declared in council, and entered in the privy-council books: and every marriage of any such descendant, without such consent, shall be null and void But in case any descendant of Geo. II., being above 25 years old, shall persist to contract a marriage disapproved of by his majesty, such descendant, after giving 12 months notice to the privy council, may contract such marriage, and the same may be duly solemnized, without the previous consent of his majesty. And such marriage shall be good except both houses of parliament shall, before the expiration of the said 12 months, declare their disapprobation of such intended marriage. And persons who shall wilfully solemnize, or assist at the celebration of such prohibited marriage, shall, on conviction, incur the penalties of the statute of *præmunire*, 16 R. II.

MARRIAGE *Settlement*, is a legal act, previous to marriage, whereby a jointure is secured to the wife after the death of the husband. (See JOINTURE.) These settlements seem to have been in use among the ancient Germans, and their kindred nation the Gauls. Of the former Tacitus gives us this account: "Dotem non uxor marito, sed uxori maritus, affert: intersunt parentes et propinqui, et munera probant." De Mor. Germ. c. 18. And Cæsar, De Bell. Gallic. lib. vi. c. 18. has given us the terms of a marriage settlement among the Gauls, as nicely calculated as any modern jointure. "Viri, quantas pecunias ab uxoribus dotis nomine acceperunt, tantas ex suis bonis, æstimatione facta, cum dotibus communicant. Hujus omnis pecuniæ conjunctim ratio habetur, fructusque servantur. Uter eorum vita superavit, ad eum pars utriusque cum fructibus superiorum temporum pervenit." The dauphin's commentator supposes that this Gaulish custom was the ground of the new regulations made by Justinian, Nov. 97. with regard to the provision for widows among the Romans; but surely there is as much reason to suppose, says judge Blackstone, that it gave the hint for our statutable jointures. Comm. vol. ii. p. 138.

See an excellent marriage settlement by Blackstone, in the Appendix to the second volume of his Commentaries.

MARRIAGE, in *Socage-tenure*, or *valor maritagii*, was not any perquisite or advantage to the guardian, but rather the reverse. For, if the guardian married his ward under the age of 14, he was bound to account to the ward for the value of the marriage, even though he took nothing for it, unless he married him to advantage. (Litt. § 123.) For the law, in favour of infants, is always jealous of guardians, and therefore in this case it made them account, not only for what they *did*, but also what they *might*, receive on the infant's behalf; but by some collusion the guardian should have received the value, and not brought it to account; but the statute (12 Car. II. c. 24.) having destroyed all values of marriages, this doctrine of course has ceased with them. At 14 years of age the ward might have disposed of himself in marriage, without any consent of his guardian, till the act (26 Geo. II. c. 33.) for preventing clandestine marriages. These doctrines of wardship and marriage in socage-tenure were so diametrically opposite to those in knight-service, and so entirely agree with those

parts

parts of king Edward's laws, that were reftored by the charter of Henry I., as might alone convince us that focage was of a higher original than the Norman conqueft. See GUARDIAN. SOCAGE, and WARDSHIP.

MARRIAGE *Vow* denotes the mutual promife made to one another by the hufband and wife at the time of the folemnization of marriage. The hufband promifes on his part "to love, comfort, honour, and keep his wife;" the wife on her's "to obey, ferve, love, honour, and keep her hufband;" in every variety of health, fortune, and condition; and both ftipulate "to forfake all others, and to keep only to one another, fo long as they both fhall live." This promife is witneffed before God and the congregation; accompanied with prayers to Almighty God for his bleffing upon it; and attended, according to the form eftablifhed in this country, with fuch circumftances of devotion and folemnity as place the obligation of it, and the guilt of violating it, nearly upon the fame foundation with that of oaths. The Chriftian Scriptures enjoin upon the wife, that obedience which fhe here promifes, and in terms fo peremptory and abfolute, that it feems to extend to every thing not criminal, or not entirely inconfiftent with the woman's happinefs. "Let the wife," fays St. Paul, "be fubject to her own hufband in every thing." "The ornament of a meek and quiet fpirit (fays the fame apoftle, fpeaking of the duty of wives) is in the fight of God of great price." No words ever expreffed the true merit of the female character fo well as thefe. The man who does not duly regard the end of the inftitution, and who is confcious at the time of his marriage, of fuch a diflike to the woman he is about to marry, or of fuch a fubfifting attachment to fome other woman, that he cannot reafonably ever hope to entertain an affection for his future wife, is guilty, when he pronounces the marriage vow, of a direct and deliberate prevarication; aggravated by thofe ideas of religion and of the fupreme being, which the place, the ritual, and the folemnity of the occafion cannot fail of fuggefting. The fame is true likewife with refpect to the woman. The charge, fays Paley, muft be imputed to all, who, from mercenary motives, marry the objects of their averfion and difguft; and likewife to thofe who defert, from any motive whatever, the object of their affection, and, without being able to fubdue that affection, marry another. The crime of falfehood is alfo incurred by the man who intends, at the time of his marriage, to commence, renew, or continue a perfonal amour with any other woman; and if a wife be capable of fo much guilt, the parity of reafon extends to her. The marriage vow is violated by adultery, and alfo by any behaviour which, knowingly, renders the life of the other miferable; as defertion, neglect, prodigality, drunkennefs, peevifhnefs, penurioufnefs, jealoufy, or any levity of conduct, which adminifters occafion of jealoufy. Paley's Principles of Mor. and Pol. Philof. vol. i.

MARRIAGE, *Maritagium*, in *Law*, fignifies not only the lawful joining of man and wife, but alfo the right of beftowing a ward, or widow, in marriage; as well as the land given in marriage. See MARITAGIUM.

MARRICA, CAPE, in *Geography*, a cape on the S.E. coaft of Arabia. N. lat. 18° 30'. E. long. 56° 25'.

MARRIONA, a bay of the ifland of Antigua; two miles S. of Willoughby bay.

MARRO, a river of Naples, which runs into the fea; eight miles S. of Nicotera.

MARROQUIN, vulgarly *Morocco leather*. See MOROCCO.

MARROSSE, in *Geography*, an ifland in the Eaft Indian fea, near Antongil bay, in the ifland of Madagafcar. This ifland affords plenty of lemons and pine apples, with an ample fupply of fruit, fowls, and frefh meat.

MARROW, a foft oleaginous fubftance contained in the cavities of the bones. See BONE and MEDULLA.

MARROW, *Spinal*. See MEDULLA *Spinalis*.

MARROWS, in *Agriculture*, a provincial word ufed to fignify fellows in fpeaking of cattle, as oxen, &c.

MARRUBIASTRUM, in *Botany*. See BALLOTA, LEONURUS, and STACHYS.

MARRUBIUM is fuppofed to have been fo called by the ancients from its having been originally found in the neighbourhood of *Marrubium*, a town of the Marfyans in Italy, eaftward of the lake Fucinus. Ambrofinus records various other conjectures as to the origin of this name. Some authors having fuppofed it derived from *mare*, the fea, becaufe a native of maritime fituations; fome have thought it was named from its bitter properties; *amarus*, bitter; and others have imagined its name to have been fuggefted by the withered appearance of its leaves, which feem as if they were corroded with ruft, *rubigo*.—Thefe ideas afford rather a prefumption that nothing is really known about the matter.—Horehound. Linn. Gen. 294. Schreb. 391. Willd. Sp. Pl. v. 3. 109. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 636. Ait. Hort. Kew. ed. 2 v. 3. 402. Tournef. t. 91. Juff. 114. Lamarck Illuftr. t. 508 (Pfeudodictamnus; Tournef. t. 89) Clafs and order, *Didynamia Gymnofpermia*. Nat. Ord. *Verticillatæ*, Linn. *Labiatæ*, Tournef. and Juff.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, falver-fhaped, rigid, ten-ftreaked; its mouth equal, fpreading, moftly ten-toothed; the teeth alternately fmaller. *Cor.* of one petal, ringent; tube cylindrical; limb gaping; throat long, tubular: upper lip erect, linear, cloven, acute, lower lip reflexed, broader, cloven half way down into three fegments, of which the middle one is broader and emarginate, the others acute. *Stam.* Filaments four, fhorter than the corolla, concealed under the upper lip, two of them longer; anthers fimple. *Pift.* Germen fuperior, four-cleft; ftyle thread-fhaped, in length and pofition like the ftamens; ftigma cloven. *Peric.* none, except the calyx, which is contracted at the neck, expanded at the mouth, including the feeds. *Seeds* four, rather oblong.

Eff. Ch. Calyx falver-fhaped, rigid, with ten furrows. Upper lip of the corolla cloven, linear, ftraight.

Obf. The following variations in the generic character of *Marrubium* are noticed by Linnæus and Schreber; thefe authors obferve that the *Marrubium* of Tournefort and *Pfeudodictamnus* of the fame author differ from each other in this refpect, the former having the upper lip of its corolla *erect*, and the latter *vaulted*. Some fpecies of this genus have only five calyx-teeth. *M. crifpum* has an entire upper lip, whilft *M. hifpanicum* has the upper lip of its corolla three or four-cleft.

A very natural divifion of *Marrubium* into two fections is afforded from the number of calyx-teeth being either five or ten. Linnæus defcribed eleven fpecies in the fourteenth edition of his *Syftema Vegetabilium*, and Willdenow has added three more; namely, *M. creticum*, which Linnæus confidered a variety of *peregrinum*, *M. catariæfolium*, and *hirfutum*. There is alfo a beautiful new fpecies in the *Flora Græca* called *velutinum*.

Sect. 1. Calyx with five teeth.

1. M. *Alyffum*. Galen's Madwort. Plaited-leaved White-Horehound. Linn. Sp. Pl. 815. (Alyffum Galeni; Ger. em. 465.)—Leaves wedge-fhaped, five-toothed, plaited. Whorls without an involucrum.—Native of Spain and Italy, flowering in July and Auguft.—*Root* perennial. *Stem* branched,

branched, rigid. *Leaves* oppoſite, hoary, bluntly toothed. *Flowers* purple, in ſmall, looſe whorls. The ſegments of the calyx ſpreading, and ending in very ſtiff prickles.—Linnæus ſays that there are three ſmall purple flowers on each ſide, and that the calyx is acute, with ſpreading teeth. Willdenow quotes *M. plicatum* of Forſkhal as a ſynonym of *M. Alyſſum*, and Vahl ſays it ſcarcely differs from it, except that the former has ten-flowered whorls, (which is ſometimes the caſe with the latter) the herbage is white with wool, and the leaves leſs wedge-ſhaped and rounder.

2. M. *aſtracanicum*. Aſtracan White-Horehound. Linn. Syſt. Veg. ed. 14. 537. Jacq. Ic. Rar. v. 1. t. 109.—Leaves ovate, crenate, downy, very rugoſe. Calyx-teeth awl-ſhaped. Upper ſegments of the corolla lanceolate and acute. Found at Aſtracan and in the Eaſt.—It flowers in May.—*Primary ſtems* perennial, numerous, half a foot in length, branched and decumbent; from theſe ſpring other *ſtems* annually, which are herbaceous, erect, a foot high, woolly and hoary. *Leaves* on ſtalks, wrinkled on both ſides, ſoft and bitter, the younger ones extremely woolly. *Flowers* ſeſſile, in whorls, of a beautiful blue colour.

3. M. *peregrinum*. Sicilian White-Horehound. Linn. Sp. Pl. 815. Jacq. Auſtr. v. 2. t. 160.—Leaves ovate-lanceolate, ſerrated. Calyx-teeth briſtle-ſhaped.—A native of Sicily, Germany, and the Levant, flowering through the ſummer.—*Root* perennial, woody, branched. *Stems* near two feet high, erect or aſcending, quadrangular, woolly below. *Leaves* oppoſite, on ſtalks, acute, veined, ſerrated, ſome of the upper ones entire. *Flowers* white, rather villoſe. *Seeds* black, furniſhed with white hairs. The plant has not much ſmell, but a bitter and ſomewhat acrid taſte. It is called Σάρομα by the modern Greeks.

4. M. *Creticum*. Cretan White-Horehound. Willd. n. 4. Sm. Prod. Fl. Græc. p. 2. 412. Dalech. Hiſt. 962.—Leaves lanceolate, whitiſh, rugoſely veined, toothed at the top. Calyx-leaves briſtle-ſhaped. Stem branched, divaricated.—A native of the Levant, flowering from July to September.—Linnæus conſidered this ſpecies merely as a variety of the laſt, calling it *peregrinum* β, and profeſſor Martyn has done the ſame.—We are however inclined to follow Dr. Smith in conſidering it as a diſtinct ſpecies. *Stems* ſlender, hoary, near three feet high. *Leaves* very hoary, much longer and narrower than thoſe of the preceding: the *whorls of flowers* are ſmaller; and the briſtly indentures of the calyx longer and erect. The whole plant has an agreeable flavour.

5. M. *candidiſſimum*. Woolly White Horehound. Linn. Sp. Pl. 816. (M. folio rotundo candidiſſimo; Dill. Elth. 218. t. 174. f. 214.)—Leaves ovate, obtuſe, toothed, rugoſely veined. Calyx-teeth awl-ſhaped. Stem ſomewhat branched at the baſe.—A native of the Levant, flowering from June to September.—*Stems* from twelve to eighteen inches in length, procumbent below, obtuſely ſquare, and villoſe. *Leaves* thick, pale-green, and hoary. *Flowers* terminal, white, in cloſe whorls.

6. M. *ſupinum*. Procumbent White Horehound. Linn. Sp. Pl. 816. (M. album, ſericeo parvo et rotundo folio; Boccon. Muſ. 78. t. 96.)—Leaves roundiſh, rather heart-ſhaped, notched. Calyx-teeth briſtly, ſtraight, woolly.—A native of Spain and the ſouth of France. It flowers from Auguſt to October.—*Stems* about eight or nine inches long, covered with a ſoft hoary down. *Leaves* ſmall, roundiſh, very ſoft, and hoary. *Flowers* white, in ſmall downy whorls.

7. M. *catariæfolium*. Cat-Mint White Horehound. Willd. Sp. Pl. v. 3. 110. Lamarck Dict. v. 3. 771. (M. orientale catariæ folio flore albo; Tourn. Cor. 12.)—Leaves ovate, deeply notched. Calyx-teeth awl-ſhaped, ſmooth, ſpreading.—A native of the Eaſt. *Stem* branched, erect, one or two feet high, ſquare, rather downy. *Leaves* much reſembling thoſe of *Nepeta Cataria*, oppoſite, on ſtalks, green above, paler beneath. *Flowers* white, many in a whorl.

8. M. *velutinum*. Velvet-White Horehound. Sm. Prod. Fl. Græc. p. 2. 412. Fl. Græc. t. 561.—Leaves roundiſh, retuſe, ſilky, rugoſe, crenate. Calyx-teeth ſpreading. Stem branched. Found by Dr. Sibthorp on Mount Parnaſſus.—The habit of this new ſpecies is very ſimilar to that of M. *vulgare*, next to be deſcribed. *Stems* about two feet high, woolly, erect, and ſtraight. *Leaves* oppoſite, on ſhort ſtalks. *Flowers* very numerous, in cloſe whorls, their tube whitiſh; upper lip pale; lower of a tawny yellow, bordered with brown.

Sect. 2. Calyx with ten teeth.

9. M. *vulgare*. White Horehound. Linn. Sp. Pl. 816. Engl. Bot. t. 410. Woodv. Med. Bot. t. 97.—Teeth of the calyx ten, briſtle-ſhaped, hooked.—Common in various parts of England, on waſte ground, and among rubbiſh, in hot, dry, duſty ſituations; flowering late in the ſummer.—*Root* perennial and woody. *Stems* a foot and half high, covered with thick wool. *Leaves* oppoſite, on footſtalks, rounded, notched, rugoſe, whitiſh, very woolly on the lower ſide. *Flowers* white, in numerous, ſeſſile whorls, which are extremely hairy. *Bracteas* briſtle-ſhaped, bearded, hooked. The whole herb is aromatic and bitter.

10. M. *africanum*. African White Horehound. Linn. Sp. Pl. 816. (Pſeudo-Dictamnus africanus, foliis ſubrotundis ſubtùs incanis; Commel. Hort. v. 2. 179. t. 90.)—Leaves heart-ſhaped, roundiſh, deeply crenate.—A native of the Cape of Good Hope, flowering from July to September.—*Root* perennial. *Stem* two feet high, upright, branched, rather downy, grooved. *Leaves* wrinkled, downy. *Flowers* whorled, white, ſhorter than the calyx; whorls remote.

11. M. *criſpum*. Curl-leaved White Horehound. Linn. Sp. Pl. 1674. (Marrubium dictamni ſpurii foliis et facie; Herm. Parad. t. 200.)—Leaves heart-ſhaped, roundiſh, notched, or rather toothed. Calyx-teeth beardleſs.—Native of the ſouth of Europe, Italy, Sicily, and Spain, flowering through the ſummer.—*Stem* rather ſhrubby, upright, rough with hairs. *Leaves* on ſtalks, much wrinkled, downy, hairy beneath. *Corolla* purpliſh, not hairy.—Willdenow obſerves that M. *criſpum* does not exactly agree with the ſynonym of Hermann, his plant having the upper lip of its corolla lanceolate and bearded, as well as its ſtamens of an equal length with the lip.—The laſt ſpecies (M. *africanum*) differs from the preſent by the helmet or upper lip of its corolla being emarginate and hairy.

12. M. *hirſutum*. Hairy White Horehound. Willd. n. 11.—Leaves heart-ſhaped, ovate, notched. Teeth of the calyx ſpreading and lanceolate. Bracteas awl-ſhaped.—We know nothing of this ſpecies but from Willdenow, who has ſeen a living ſpecimen, and ſays that it is very cloſely allied to the following in foliage and habit, but different as to the *calyx* and *bracteas*.

13. M. *hiſpanicum*. Spaniſh White Horehound. (Linn. Sp. Pl. 816. M. album rotundifolium hiſpanicum; Herm. Parad. t. 201.)—Leaves heart-ſhaped, notched, ovate. Border of the calyx ſpreading; teeth ovate, pointed. Bracteas oblong.—A native of Spain, where it flowers in the ſummer.—*Stems* erect, downy. *Leaves* wrinkled and downy, more round and ſerrated than in M. *vulgare*. The whole plant is extremely hoary. Linnæus remarks that the *leaves* are roundiſh, flat, and crenate; the upper lip of the *corolla*

corolla trifid or quadrifid; the teeth of the *calyx* alternately larger and fmaller.

14. M. *Pfeudo-Dictamnus.* Shrubby White Horehound. Linn. Sp. 817. (Pfeudo-Dictamnum; Dod. Pempt. 281.)—Calyx-border flat and hairy. Leaves heart-fhaped, concave. Stem fhrubby. A native of the ifland of Candia. Found alfo by Dr. Sibthorp in other iflands of the Archipelago.—It flowers from June to Auguft.—*Stem* two or three feet high, divided into many branches. *Leaves* fmall, growing very clofe to the ftalks. *Flowers* whorled, of a white colour; whorls refembling thofe of M. *crifpum*, but not fo large. The whole plant very hoary, covered with a fort of denfe compact cottony fubftance.—This fpecies is the Ψευδοδικταμνος of Diofcorides, and is called in Englifh the falfe Dittany of Crete, from its general refemblance to *Origanum Dictamnus.*

15. M. *acetabulofum.* Saucer-like White Horehound. Linn. Sp. Pl. 817. (Dictamnus falfus verticillatus, pericarpio conoide, bæticus; Barrel. It. t. 129.)—Calyx-border longer than the tube, membranaceous, the greater angles rounded.—A native of Crete, introduced by fir George Wheeler into this country in 1676. Its time of flowering exactly coincides with the laft.—*Stems* about two feet high, hairy. *Leaves* heart-fhaped, ferrated, rough on their upper fide, downy beneath. *Flowers* fmall, of a pale purple, in large whorls.—Dr. Sibthorp found this fpecies in Crete, but not in any other of the Grecian iflands. It was known to Diofcorides, who called it Ἑτερος απο Κρητης δικταμνος.

The genus now defcribed is compofed of many curious and interefting fpecies to the botanift, though only a few of them find a place in our gardens. Thofe which are cultivated as fhrubs, efpecially the two laft, from the hoarinefs of their foliage, make a pretty variety when intermixed with other plants.—M. *velutinum*, which is one day to appear in the *Flora Græca*, is entirely new, and we have adopted it from the Prodromus to that work.

Marrubium, in *Gardening*, comprifes plants of the fhrubby kind, of which the fpecies cultivated are, the fhrubby white horehound (M. Pfeudo-Dictamnus); and the faucer-leaved white horehound (M. acetabulofum).

Method of Culture.—Thefe forts of plants are capable of being increafed by planting cuttings of the young fhoots or branches in a fhady border in the early fpring, as about April. When the plants are well rooted, they may be removed into the places where they are to grow: when they grow ftrongly, they fhould be fcreened from hard frofts in winter.

They continue the longeft in poor dry foils, from their having a lefs luxuriant growth in fuch cafes.

Thefe plants afford variety in the borders, clumps, &c. of pleafure-grounds, and other fituations.

Marrubium, in *Ancient Geography*, a town of Italy, and capital of the Marfi; feated on the E. bank of the lake Fucinus. The inhabitants of this town, as well as the Marfi, in general, were famous for difregarding and healing the bites of ferpents, and for being excellent fwimmers. Its ruins at St. Benedotto, prefent to the inveftigation of the curious an arena, and traces of the circuit of a fpacious amphitheatre.

Marrubium, in the *Materia Medica.* See Horehound.

MARRUCINI, in *Ancient Geography*, a people of Italy, in the Adriatic gulf, between the Veftini and the Frentani. Their country was watered by the Aternus. In their origin they were Sabines. Their principal town was Teate, feated on a mountain.

MARS, in *Aftronomy*, one of the primary planets in our folar fyftem; its orbit is fituated between thofe of the Earth and Jupiter. It evidently owes its name to its fiery appearance, which is fuppofed, with much probability, to be derived from its own atmofphere, the exiftence of which is indicated with more certainty than in any other planet.

Befides the ruddy colour of Mars, we have another argument of his being encompaffed with an atmofphere; and it is this: that, when any of the fixed ftars are feen near his body, they appear extremely obfcured, and almoft extinct. If this be the cafe, an eye placed in Mars would fcarcely ever fee Mercury, unlefs, perhaps, in the fun at the time of conjunction, when Mercury paffes over his difk, as he fometimes appears to us, in form of a fpot. A fpectator in Mars will fee Venus about the fame diftance from the fun as Mercury appears to us; and the Earth as big as Venus appears to us, and never above 48 degrees from the fun: and when the Earth is found in conjunction with, and very near the fun, he will fee the Earth appear horned, or falcated, and its attendant the moon of the fame figure, and, at its utmoft diftance from the Earth, not above 15 minutes of a degree, though they are really two hundred and forty thoufand miles afunder. This planet being but a fifth part fo big as the Earth, if any moon attends him, fhe muft be very fmall, and has not yet been difcovered by our beft telefcopes.

The telefcopic appearance of Mars is very variable; but the predominant brightnefs of the polar regions leads to the fuppofition that its poles, like thofe of the Earth, are covered with perpetual fnow; and Dr. Herfchel imagines that the changes in brightnefs are connected with the fummer and winter feafons on that planet. In the year 1784, he publifhed in the Philofophical Tranfactions, vol. lxxiv., an account of a very laborious inveftigation of all the circumftances relating to the telefcopic phenomena of this planet, and concludes by giving the following refult:

1. The axis of Mars is inclined to the ecliptic 59° 42′.
2. The node of its axis is in 17° 47′ of Pifces.
3. The obliquity of the ecliptic on the globe of Mars is 28° 42′.
4. The point Aries of the ecliptic of Mars anfwers to our 19° 28′ of Sagittarius.
5. The figure of Mars is that of an oblate fpheroid, whofe equatorial diameter is to the polar one as 1355 to 1272, or as 16 to 15 nearly.
6. The equatorial diameter of Mars reduced to the mean diftance of the earth from the fun, is 9″ 8‴.
7. This planet has a confiderable, but moderate atmofphere, fo that its inhabitants probably enjoy a fituation in many refpects fimilar to ours.

Dr. Hook, in 1665, obferved feveral fpots in Mars; which, having a motion, he concluded the planet to turn round its centre. In 1666, M. Caffini obferved feveral fpots in the two faces or hemifpheres of Mars, which, by continuing his different obfervations very diligently, he found to move by little and little from eaft to weft, and to return, in the fpace of 24 hours 40 minutes, to their former fituation. Thefe obfervations were repeated in 1670, and confirmed by Maraldi, 1704 and 1719. Whence both the motion and period, or natural day, of that planet, were determined.

Plate XVII. *Aftronomy, fig.* 2, reprefents the appearance of the two luminous fpots, which, by an optical illufion, feem to project beyond the circumference of the difk. Mars feems to move from weft to eaft round the earth: the mean length of a fiderial revolution is 1ʸ 321ᵈ 23ʰ 30′ 35″.6. Its motion is very unequal: when it begins to be vifible in the morning, it is direct and moft rapid; it becomes gradually flower, and when the planet arrives at about 136° 48′ from the fun, it is ftationary; the motion then becomes retrograde, increasing in velocity till the moment of opposition of the planet with the sun.

This velocity then becomes a maximum, diminishes and again becomes nothing when Mars approaching the sun is distant from it 136° 48′. Its motion then becomes again direct, after having been retrograde during 73 days, and in this interval the planet describes an arc of retrogradation of about 16° 12′. Continuing to approach the sun, it finishes by immerging in the evening in its rays. These singular phenomena are renewed at every opposition of Mars, but with a considerable difference as to the extent and duration of these retrogradations.

Mars does not move exactly in the plane of the ecliptic, but deviates occasionally several degrees. The variations in its apparent diameter are very great. It is about 10″ in its mean state, and augments to 29″1. as the planet approaches its opposition. At this time the parallax of Mars becomes sensible, and is nearly double that of the sun. The same law which exists between the parallaxes of the sun and Venus, exists likewise between the sun and Mars, and the observation of this last parallax had given a very near approximation of the solar parallax before the transit of Venus had ascertained it with greater precision.

The disk of Mars changes its form, and becomes sensibly oval according to the relative position of the sun. These phases shew that it is from the sun it receives its light. From the observation of spots distinctly seen on its surface, it is inferred that it moves on itself from west to east, in a period of $1^d\ 0^h\ 44'\ 45''.3$. From observations made by Dr. Herschel in 1779, he concludes that the sidereal revolution of Mars cannot well be less than $24^h\ 39'\ 5''$, nor more than $24^h\ 39'\ 22''$.

The mean diameter of Mars is about 4000 miles, or nearly half that of the earth.

Its character is ♂. Its mean distance from the sun is 1.52369 of those parts, whereof the distance of the sun from the earth is 1.00000; its excentricity 14,218; and its real distance 145,014,148 miles; its mean distance from the sun in semi-diameters of the earth 36,262: the periodical time, in which it makes its revolutions round the sun, is 686 days 23 hours; which is the length of his year, and contains $667\frac{3}{4}$ of his days; every day and night together being 40 minutes longer than with us; and its revolution about its own axis is performed in 24 hours 40 minutes nearly. Its proportion of light, that of the earth being 1, is .43; proportion of bulk, that of the sun being 1,380,000, is $\frac{7}{24}$; and of density, that of the sun being $\frac{1}{4}$, is $\frac{7}{16}$.

In the acronical rising of this planet, that is, when it is in opposition to the sun, it is found five times nearer to us than when in conjunction with him; and, therefore, he appears so much bigger and brighter at one time than another.

Mars, having his light from the sun, and revolving round it, has an increase and decrease like the moon: it may also be observed almost bisected, when in its quadratures with the sun, or in his perigæon; but never is seen corniculated, or falcated, as the inferior planets; which both shews that his orbit includes the earth's within it, and that he shines not by his own light. The phases of Mars were first discovered by Galileo.

This planet's distance from the sun is to the distance of the earth and sun, as $1\frac{1}{2}$ to 1; so that a man, placed in Mars, would see the sun's diameter less by one-third than it appears to us; and, consequently, the degree of light and heat, which Mars receives from the sun, is less than that received by the earth, in the proportion of 4 to 9. This proportion, however, will admit of a sensible variation, on account of the great excentricity of this planet.

For the other elements of the orbit of this planet, the reader is referred to the article PLANET.

TABLE I. Epochs of the Mean Longitude of Mars, with the Arguments of the Equations.

Years.	Mean Long.	Aphelion.	Node.	Arg. II.	Arg. III.	Arg. IV.	Arg. V.	Arg. VI.	Arg. VII.	Arg. VIII.	Arg. IX.
	S. D. M. S.	S. D. M. S.	S. D. M. S.								
B. O. S. 1500	1 23 46 9.4	4 26 48 19	1 15 44 22	221	271	493	952	155	005	149	145
B. N. S. 1600	3 20 13 33.6	4 28 39 57	1 16 29 54	946	573	520	374	972	339	632	192
B. 1620	11 8 23 55.8	4 29 2 17	1 16 39 1	893	836	730	059	337	606	731	801
B. 1640	6 26 54 17.9	4 29 24 37	1 16 48 7	841	098	940	744	703	874	829	411
B. 1660	2 15 14 40.1	4 29 46 57	1 16 57 14	788	361	150	429	070	141	928	020
B. 1680	10 3 35 2.2	5 0 9 17	1 17 6 21	736	623	360	113	436	408	027	630
C. 1700	5 21 23 57.7	5 0 31 37	1 17 15 27	683	885	569	798	802	676	126	239
B. 1720	1 9 44 19.8	5 0 53 57	1 17 24 34	630	147	777	483	167	943	224	848
B. 1740	8 28 4 42.0	5 1 16 17	1 17 33 40	578	410	987	168	533	211	323	457
B. 1760	4 16 25 4.2	5 1 38 37	1 17 42 47	525	672	197	853	900	478	422	067
B. 1780	0 4 45 26.3	5 2 0 57	1 17 51 54	472	935	407	538	266	745	521	676
C. 1800	7 22 34 21.8	5 2 23 17	1 18 1 1	420	197	617	223	632	013	619	286
1801	2 3 51 31.2	5 2 24 24	1 18 1 28	867	560	427	307	100	076	024	317
1802	8 15 8 40.7	5 2 25 31	1 18 1 55	314	923	237	391	568	140	428	347
1803	2 26 25 50.1	5 2 26 38	1 18 2 23	761	285	047	475	036	203	833	378
B. 1804	9 8 14 26.2	5 2 27 45	1 18 2 50	208	649	857	560	504	266	238	408
1805	3 19 31 35.6	5 2 28 52	1 18 3 17	655	012	667	644	972	330	643	438
1806	10 0 48 35.1	5 2 29 59	1 18 3 44	102	375	477	728	439	393	047	469
1807	4 12 5 44.5	5 2 31 6	1 18 4 12	549	734	287	812	907	456	452	499
B. 1808	10 23 54 30.7	5 2 32 13	1 18 4 39	997	101	099	897	377	519	858	530
1809	5 5 11 40.1	5 2 33 20	1 18 5 6	444	464	909	981	845	582	263	560
1810	11 16 28 49.6	5 2 34 27	1 18 5 34	891	827	719	065	312	646	667	591
1811	5 27 45 59.0	5 2 35 34	1 18 6 1	338	190	529	149	780	709	072	621
B. 1812	0 9 34 35.1	5 2 36 41	1 18 6 28	787	554	341	234	250	773	478	652
1813	6 20 51 44.5	5 2 37 48	1 18 6 56	234	917	151	318	718	836	883	682
1814	1 2 8 54.0	5 2 38 55	1 18 7 23	681	280	961	402	185	900	287	713
1815	7 13 26 3.4	5 2 40 2	1 18 7 50	128	642	771	486	653	963	691	743
B. 1816	1 25 14 39.6	5 2 41 9	1 18 8 18	576	006	583	571	123	026	097	774
1817	8 6 31 49.0	5 2 42 16	1 18 8 45	023	369	393	655	591	089	502	804
1818	2 17 48 58.5	5 2 43 23	1 18 9 12	470	732	203	739	059	153	906	835
1819	8 29 6 7.9	5 2 44 30	1 18 9 40	917	095	013	823	527	216	311	865
B. 1820	3 10 54 44.0	5 2 45 37	1 18 10 7	366	459	825	908	997	280	717	896

TABLE II. Mean Motion of Mars for *Years*, with the Arguments of the Equations.

Years.		Mot. Longitude.				Mot. Aphel.			Mot. Nod.		Arg. II.	Arg. III.	Arg. IV.	Arg. V.	Arg. VI.	Arg. VII.	Arg. VIII	Arg. IX.
		S.	D.	M.	S.	D.	M.	S.	M.	S.								
	1	6	11	17	9 4	0	1	7	0	27	447	363	810	084	468	063	405	030
	2	0	22	34	18 9	0	2	14	0	55	894	726	620	168	935	127	809	861
	3	7	3	51	28.3	0	3	21	1	22	341	088	430	253	403	190	214	091
B.	4	1	15	40	4 4	0	4	28	1	49	789	452	242	337	873	253	620	122
	5	7	26	57	13.8	0	5	35	2	17	236	815	052	421	341	316	024	152
	6	2	8	14	23.3	0	6	42	2	44	683	078	862	505	808	380	429	183
	7	8	19	31	32.7	0	7	49	3	11	130	540	672	590	276	443	834	213
B.	8	3	1	20	8.9	0	8	56	3	39	579	905	484	674	746	507	240	244
	9	9	12	37	18.3	0	10	3	4	6	026	267	294	758	214	570	645	274
	10	3	23	54	27.8	0	11	10	4	33	473	630	104	842	681	634	049	305
	11	10	5	11	37.2	0	12	17	5	1	920	993	914	927	149	697	454	335
B.	12	4	17	0	13.3	0	13	24	5	28	368	357	726	012	620	760	859	366
	13	10	28	17	22.7	0	14	31	5	55	815	720	536	096	088	823	264	396
	14	5	9	34	32.2	0	15	38	6	23	262	083	346	180	555	887	668	427
	15	11	20	51	41.6	0	16	45	6	50	709	445	156	264	023	950	073	457
B.	16	6	2	40	17.7	0	17	52	7	17	158	810	968	348	493	014	479	488
	17	0	13	57	27.1	0	18	59	7	45	605	173	778	432	961	077	884	518
	18	6	25	14	36.6	0	20	6	8	12	052	536	588	516	418	141	289	549
	19	1	6	31	46.0	0	21	13	8	39	497	898	398	601	896	204	694	579
B.	20	7	18	20	22.2	0	22	20	9	7	947	263	210	685	366	267	099	609
B.	40	3	6	40	44.3	0	44	40	18	13	895	525	420	370	732	535	198	219
B.	60	10	25	1	6.5	1	7	0	27	20	842	788	629	055	099	802	296	828
B.	80	6	13	21	28.6	1	29	20	36	27	790	050	839	740	465	069	395	438
B.	100	2	1	41	50.7	1	51	40	45	33	737	312	049	425	831	337	494	047
C.	100	2	1	10	24.1	1	51	40	45	33	736	311	047	424	830	337	493	047

TABLE III. Mean Motion of Mars for *Months*, with the Arguments of the Equations.

Months.	Mot. Longitude.				Mot. Aphelion.	Mot. Node.	Arg. II.	Arg. III.	Arg. IV.	Arg. V.	Arg. VI.	Arg. VII.	Arg. VIII.	Arg. IX.
	S.	D.	M.	S.	SEC.	SEC.								
January - -	0	0	0	0.0	0.0	0.0	000	000	000	000	000	000	000	000
February -	0	16	14	46.3	5.7	2.3	038	031	069	007	040	005	034	003
March - -	1	0	55	12.7	10.8	4.4	072	059	131	014	076	010	066	005
April - -	1	17	9	59.0	16.5	6.8	110	090	200	021	115	015	100	008
May - -	2	2	53	18.7	22.0	9.0	147	120	267	028	154	021	133	010
June - -	2	19	8	5.1	27.7	11.3	185	150	336	035	194	026	168	013
July - -	3	4	51	24.7	33.2	13.6	221	180	401	042	232	031	201	015
Auguſt - -	3	21	6	11.1	38.9	15.9	259	211	470	049	272	036	235	018
September -	4	7	20	57.4	44.6	18.2	298	242	539	056	311	042	269	020
October - -	4	23	4	17.1	50.1	20.5	334	272	606	063	350	047	303	023
November -	5	9	19	3.4	55.8	22.8	372	302	674	070	389	053	337	026
December -	5	25	2	23.1	61.4	25.1	409	332	741	077	428	058	370	028

TABLE IV. Mean Motion of Mars for *Days*, with the Arguments of the Equations.

Days of Month.	Mot. Longitude. D.	M.	S.	Mot. Aphel. SEC.	Mot. Node. SEC.	Arg. II.	Arg. III.	Arg. IV.	Arg. V.	Arg. VI.	Arg. VII.	Arg. VIII.	Arg. IX.
1	0	31	26.7	0.2	0.1	001	001	002	000	001	000	001	000
2	1	2	53.3	0.4	0.2	002	002	004	000	003	000	002	000
3	1	34	20.0	0.5	0.2	004	003	007	001	004	000	003	000
4	2	5	46.6	0.7	0.3	005	004	009	001	005	001	004	000
5	2	37	13.3	0.9	0.4	006	005	011	001	006	001	006	000
6	3	8	39.9	1.1	0.5	007	006	013	001	008	001	007	001
7	3	40	6.6	1.3	0.5	009	007	016	002	009	001	008	001
8	4	11	33.2	1.5	0.6	010	008	018	002	010	001	009	001
9	4	42	59.9	1.6	0.7	011	009	020	002	012	002	010	001
10	5	14	26.6	1.8	0.8	012	010	022	002	013	002	011	001
11	5	45	53.2	2.0	0.8	014	011	024	003	014	002	012	001
12	6	17	19.9	2.2	0.9	015	012	027	003	015	002	013	001
13	6	48	46.5	2.4	1.0	016	013	029	003	017	002	014	001
14	7	20	13.2	2.6	1.1	017	014	031	003	018	002	016	001
15	7	51	39.8	2.7	1.1	018	015	033	003	019	003	017	001
16	8	23	6.5	2.9	1.2	020	016	036	004	020	003	018	001
17	8	54	33.2	3.1	1.3	021	017	038	004	022	003	019	001
18	9	25	59.8	3.3	1.4	022	018	040	004	023	003	020	002
19	9	57	26.5	3.5	1.4	023	019	042	004	024	003	021	002
20	10	28	53.1	3.7	1.5	025	020	044	005	026	003	022	002
21	11	0	19.8	3.8	1.6	026	021	047	005	027	004	023	002
22	11	31	46.4	4.0	1.7	027	022	049	005	028	004	024	002
23	12	3	13.1	4.2	1.7	028	023	051	005	030	004	026	002
24	12	34	39.7	4.4	1.8	029	024	053	006	031	004	027	002
25	13	6	6.4	4.6	1.9	031	025	056	006	032	004	028	002
26	13	37	33.1	4.8	2.0	032	026	058	006	033	004	029	002
27	14	8	59.7	4.9	2.0	033	027	060	006	035	005	030	002
28	14	40	26.4	5.1	2.1	034	028	062	006	036	005	031	002
29	15	11	53.0	5.3	2.2	036	029	064	007	037	005	032	002
30	15	43	19.7	5.5	2.3	037	030	067	007	038	005	033	003
31	16	14	46.3	5.7	2.3	038	031	069	007	040	005	034	003

In the Months January and February of a Biſſextile Year, ſubtract 1 from the given Day of the Month.

TABLE V. Mean Motion of Mars for *Hours*, with the Arguments of the Equations.

For Hours.										
Hours.	Mot. Long.		Arg. II.	Arg. III.	Arg. IV.	Arg. V.	Arg. VI.	Arg. VII.	Arg. VIII	Arg. IX.
	M.	S.								
1	1	18.6	0	0	0	0	0	0	0	0
2	2	37.2	0	0	0	0	0	0	0	0
3	3	55.8	0	0	0	0	0	0	0	0
4	5	14.4	0	0	0	0	0	0	0	0
5	6	33.1	0	0	0	0	0	0	0	0
6	7	51.7	0	0	1	0	0	0	0	0
7	9	10.3	0	0	1	0	0	0	0	0
8	10	28.9	0	0	1	0	0	0	0	0
9	11	47.5	0	0	1	0	0	0	0	0
10	13	6.1	0	0	1	0	0	0	0	0
11	14	24.7	1	0	1	0	1	0	0	0
12	15	43.3	1	0	1	0	1	0	1	0
13	17	1.9	1	1	1	0	1	0	1	0
14	18	20.5	1	1	1	0	1	0	1	0
15	19	39.1	1	1	1	0	1	0	1	0
16	20	57.8	1	1	1	0	1	0	1	0
17	22	16.4	1	1	2	0	1	0	1	0
18	23	35.0	1	1	2	0	1	0	1	0
19	24	53.6	1	1	2	0	1	0	1	0
20	26	12.2	1	1	2	0	1	0	1	0
21	27	30.8	1	1	2	0	1	0	1	0
22	28	49.4	1	1	2	0	1	0	1	0
23	30	8.0	1	1	2	0	1	0	1	0
24	31	26.7	1	1	2	0	1	0	1	0

TABLE VI. Mean Motion of Mars for *Minutes* and *Seconds*.

For Minutes.						For Seconds.	
Min.	Mot. Long.		Min.	Mot. Long.		Sec.	Mot. Lon.
	M.	S.		M.	S.		SEC.
1	0	1.3	31	0	40.6	1	0.02
2	0	2.6	32	0	41.9	2	0.04
3	0	3.9	33	0	43.2	3	0.07
4	0	5.2	34	0	44.5	4	0.09
5	0	6.6	35	0	45.9	5	0.11
6	0	7.9	36	0	47.2	6	0.13
7	0	9.2	37	0	48.5	7	0.15
8	0	10.5	38	0	49.8	8	0.17
9	0	11.8	39	0	51.1	9	0.20
10	0	13.1	40	0	52.4	10	0.22
11	0	14.4	41	0	53.7	20	0.44
12	0	15.7	42	0	55.0	30	0.65
13	0	17.0	43	0	56.3	40	0.87
14	0	18.3	44	0	57.6	50	1.09
15	0	19.7	45	0	59.0		
16	0	21.0	46	1	0.3		
17	0	22.3	47	1	1.6		
18	0	23.6	48	1	2.9		
19	0	24.9	49	1	4.2		
20	0	26.2	50	1	5.5		
21	0	27.5	51	1	6.8		
22	0	28.8	52	1	8.1		
23	0	30.1	53	1	9.4		
24	0	31.4	54	1	10.7		
25	0	32.8	55	1	12.1		
26	0	34.1	56	1	13.4		
27	0	35.4	57	1	14.7		
28	0	36.7	58	1	16.0		
29	0	38.0	59	1	17.3		
30	0	39.3	60	1	18.6		

TABLE VII. Equation of the Centre of Mars for Jan. 1, 1800, with the Secular Variation, to be applied to the Longitude.

Argument. The mean Anomaly of Mars, or mean Longitude of Mars — Longitude of the Aphelion.										
Deg.	Sig. O. —	Diff.	Var. —	Sig. I. —	Diff.	Var. —	Sig. II. —	Diff.	Var. —	Deg.
	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	
0 0	0 0 0.0	100.1	0.0	4 50 39.5	90.3	15.2	8 42 26.8	60.9	28.2	30 0
10	0 1 40.2	100.1	0.1	4 52 9.8	90.2	15.2	8 43 27.7	60.6	28.2	29 50
20	0 3 20.3	100.1	0.2	4 53 40.0	90.1	15.3	8 44 28.3	60.4	28.3	40
30	0 5 0.4	100.2	0.2	4 55 10.1	90.0	15.4	8 45 28.7	60.1	28.4	30
40	0 6 40.6	100.1	0.3	4 56 40.1	89.8	15.5	8 46 28.8	59.9	28.4	20
50	0 8 20.7	100.1	0.4	4 58 9.9	89.8	15.6	8 47 28.7	59.6	28.5	10
1 0	0 10 0.8	100.1	0.5	4 59 39.7	89.7	15.7	8 48 28.3	59.4	28.6	29 0
10	0 11 40.9	100.1	0.6	5 1 9.4	89.5	15.7	8 49 27.7	59.2	28.6	28 50
20	0 13 21.0	100.1	0.6	5 2 38.9	89.4	15.8	8 50 26.9	59.0	28.7	40
30	0 15 1.1	100.1	0.7	5 4 8.3	89.3	15.9	8 51 25.9	58.8	28.8	30
40	0 16 41.2	100.2	0.8	5 5 37.6	89.2	16.0	8 52 24.7	58.6	28.8	20
50	0 18 21.4	100.1	0.9	5 7 6.8	89.1	16.1	8 53 23.3	58.4	28.9	10
2 0	0 20 1.5	100.0	1.0	5 8 35.9	89.0	16.2	8 54 21.7	58.2	28.9	28 0
10	0 21 41.5	100.1	1.0	5 10 4.9	88.9	16.2	8 55 19.9	58.0	29.0	27 50
20	0 23 21.6	100.1	1.1	5 11 33.8	88.7	16.3	8 56 17.9	57.7	29.1	40
30	0 25 1.7	100.0	1.2	5 13 2.5	88.6	16.4	8 57 15.6	57.5	29.1	30
40	0 26 41.7	100.1	1.3	5 14 31.1	88.4	16.4	8 58 13.1	57.2	29.2	20
50	0 28 21.8	100.1	1.4	5 15 59.5	88.2	16.5	8 59 10.3	56.9	29.2	10
3 0	0 30 1.9	100.0	1.5	5 17 27.7	88.1	16.6	9 0 7.2	56.7	29.3	27 0
10	0 31 41.9	100.0	1.5	5 18 55.8	88.1	16.6	9 1 3.9	56.5	29.4	26 50
20	0 33 21.9	100.1	1.6	5 20 23.9	88.0	16.7	9 2 0.4	56.3	29.4	40
30	0 35 2.0	100.0	1.7	5 21 51.9	87.9	16.8	9 2 56.7	56.1	29.5	30
40	0 36 42.0	100.0	1.8	5 23 19.8	87.8	16.9	9 3 52.8	55.9	29.5	20
50	0 38 22.0	100.1	1.9	5 24 47.6	87.6	17.0	9 4 48.7	55.6	29.6	10
4 0	0 40 2.1	100.0	2.0	5 26 15.2	87.5	17.1	9 5 44.3	55.4	29.6	26 0
10	0 41 42.1	99.9	2.1	5 27 42.7	87.4	17.1	9 6 39.7	55.2	29.7	25 50
20	0 43 22.0	99.9	2.2	5 29 10.1	87.3	17.2	9 7 34.9	54.9	29.8	40
30	0 45 1.9	99.9	2.3	5 30 37.4	87.1	17.3	9 8 29.8	54.7	29.8	30
40	0 46 41.8	100.0	2.4	5 32 4.5	87.0	17.4	9 9 24.5	54.5	29.9	20
50	0 48 21.8	99.9	2.5	5 33 31.5	86.9	17.5	9 10 19.0	54.3	30.0	10
5 0	0 50 1.7	99.8	2.6	5 34 58.4	86.8	17.6	9 11 13.3	54.1	30.0	25 0
10	0 51 41.5	99.9	2.6	5 36 25.2	86.7	17.6	9 12 7.4	53.8	30.1	24 50
20	0 53 21.4	99.9	2.7	5 37 51.9	86.5	17.7	9 13 1.2	53.5	30.1	40
30	0 55 1.3	99.8	2.8	5 39 18.4	86.3	17.8	9 13 54.7	53.2	30.2	30
40	0 56 41.1	99.8	2.9	5 40 44.7	86.2	17.9	9 14 47.9	53.0	30.2	20
50	0 58 20.9	99.8	3.0	5 42 10.9	86.1	18.0	9 15 40.9	52.7	30.3	10
6 0	1 0 0.7		3.1	5 43 37.0		18.1	9 16 33.6		30.3	24 0
	Sig. XI. +			Sig. X. +			Sig. IX. +			

TABLE VII. Equation of the Centre of Mars for Jan. 1, 1800, with the Secular Variation, to be applied to the Longitude.

Argument. The mean Anomaly of Mars, or mean Longitude of Mars — Longitude of the Aphelion.

Deg.	Sig. III. —	Diff.	Var. —	Sig. IV. —	Diff.	Var. —	Sig. V. —	Diff.	Var. —	Deg.
	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	
0 0	10 37 16.4	12.6	36.4	9 46 26.6	48.0	35.6	5 55 36.7	103.3	22.6	30 0
10	10 37 29.0	12.3	36.4	9 45 38.6	48.3	35.6	5 53 53.4	103.5	22.6	29 50
20	10 37 41.3	12.0	36.4	9 44 50.3	48.6	35.5	5 52 9.9	103.7	22.5	40
30	10 37 53.3	11.7	36.4	9 44 1.7	48.9	35.5	5 50 26.2	103.9	22.4	30
40	10 38 5.0	11.3	36.4	9 43 12.8	49.2	35.4	5 48 42.3	104.2	22.3	20
50	10 38 16.3	11.1	36.4	9 42 23.6	49.5	35.4	5 46 58.1	104.4	22.2	10
1 0	10 38 27.4	10.8	36.5	9 41 34.1	49.9	35.3	5 45 13.7	104.7	22.1	29 0
10	10 38 38.2	10.4	36.5	9 40 44.2	50.3	35.3	5 43 29.0	105.0	21.9	28 50
20	10 38 48.6	10.1	36.5	9 39 53.9	50.7	35.2	5 41 44.0	105.2	21.8	40
30	10 38 58.7	9.8	36.5	9 39 3.2	51.1	35.2	5 39 58.8	105.4	21.7	30
40	10 39 8.5	9.5	36.5	9 38 12.1	51.4	35.1	5 38 13.4	105.7	21.6	20
50	10 39 18.0	9.2	36.5	9 37 20.7	51.7	35.1	5 36 27.7	106.0	21.5	10
2 0	10 39 27.2	8.9	36.6	9 36 29.0	52.0	35.0	5 34 41.7	106.2	21.4	28 0
10	10 39 36.1	8.6	36.6	9 35 37.0	52.4	35.0	5 32 55.5	106.4	21.3	27 50
20	10 39 44.7	8.3	36.6	9 34 44.6	52.7	34.9	5 31 9.1	106.6	21.2	40
30	10 39 53.0	7.9	36.6	9 33 51.9	53.0	34.9	5 29 22.5	106.8	21.1	30
40	10 40 0.9	7.5	36.6	9 32 58.9	53.4	34.9	5 27 35.7	106.9	21.0	20
50	10 40 8.4	7.2	36.6	9 32 5.5	53.7	34.8	5 25 48.8	107.1	20.9	10
3 0	10 40 15.6	6.9	36.7	9 31 11.8	54.0	34.8	5 24 1.7	107.4	20.8	27 0
10	10 40 22.5	6.6	36.7	9 30 17.8	54.4	34.8	5 22 14.3	107.7	20.7	26 50
20	10 40 29.1	6.3	36.7	9 29 23.4	54.7	34.7	5 20 26.6	107.9	20.5	40
30	10 40 35.4	6.0	36.7	9 28 28.7	55.1	34.7	5 18 38.7	108.2	20.4	30
40	10 40 41.4	5.7	36.7	9 27 33.6	55.5	34.7	5 16 50.5	108.4	20.3	20
50	10 40 47.1	5.5	36.7	9 26 38.1	55.8	34.6	5 15 2.1	108.6	20.2	10
4 0	10 40 52.6	5.1	36.8	9 25 42.3	56.1	34.6	5 13 13.5	108.8	20.1	26 0
10	10 40 57.7	4.8	36.8	9 24 46.2	56.5	34.6	5 11 24.7	109.0	20.0	25 50
20	10 41 2.5	4.4	36.8	9 23 49.7	56.8	34.5	5 9 35.7	109.2	19.8	40
30	10 41 6.9	4.1	36.8	9 22 52.9	57.1	34.5	5 7 46.5	109.5	19.7	30
40	10 41 11.0	3.8	36.8	9 21 55.8	57.4	34.4	5 5 57.0	109.7	19.6	20
50	10 41 14.8	3.4	36.8	9 20 58.4	57.8	34.4	5 4 7.3	110.0	19.5	10
5 0	10 41 18.2	3.1	36.9	9 20 0.6	58.1	34.3	5 2 17.3	110.1	19.4	25 0
10	10 41 21.3	2.8	36.9	9 19 2.5	58.5	34.3	5 0 27.2	110.3	19.3	24 50
20	10 41 24.1	2.5	36.9	9 18 4.0	58.8	34.2	4 58 36.9	110.5	19.1	40
30	10 41 26.6	2.1	36.9	9 17 5.2	59.2	34.2	4 56 46.4	110.7	19.0	30
40	10 41 28.7	1.8	36.9	9 16 6.0	59.6	34.1	4 54 55.7	110.9	18.9	20
50	10 41 30.5	1.5	36.9	9 15 6.4	59.9	34.1	4 53 4.8	111.1	18.8	10
6 0	10 41 32.0		37.0	9 14 6.5		34.0	4 51 13.7		18.7	24 0
	Sig. VIII. +			Sig. VII. +			Sig. VI. +			

Table VII. Equation of the Centre of Mars for Jan. 1, 1800, with the Secular Variation, to be applied to the Longitude.

Argument. The mean Anomaly of Mars, or mean Longitude of Mars — Longitude of the Aphelion.

Deg.	Sig. O. —	Diff.	Var. —	Sig. I. —	Diff.	Var. —	Sig. II. —	Diff.	Var. —	Deg.
	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	
6 0	1 0 0.7	99.7	3.1	5 43 37.0	86.0	18.1	9 16 33.6	52.5	30.3	24 0
10	1 1 40.4	99.7	3.1	5 45 3.0	85.9	18.1	9 17 26.1	52.3	30.3	23 50
20	1 3 20.1	99.6	3.2	5 46 28.9	85.7	18.2	9 18 18.4	52.1	30.4	40
30	1 4 59.7	99.7	3.3	5 47 54.6	85.6	18.3	9 19 10.5	51.9	30.4	30
40	1 6 39.4	99.7	3.4	5 49 20.2	85.4	18.3	9 20 2.4	51.7	30.5	20
50	1 8 19.1	99.6	3.5	5 50 45.6	85.2	18.4	9 20 54.1	51.4	30.6	10
7 0	1 9 58.7	99.6	3.6	5 52 10.8	85.1	18.5	9 21 45.5	51.2	30.7	23 0
10	1 11 38.3	99.6	3.6	5 53 35.9	85.0	18.5	9 22 36.7	50.9	30.7	22 50
20	1 13 17.9	99.6	3.7	5 55 0.9	84.9	18.6	9 23 27.6	50.7	30.8	40
30	1 14 57.5	99.5	3.8	5 56 25.8	84.8	18.7	9 24 18.3	50.4	30.8	30
40	1 16 37.0	99.5	3.9	5 57 50.6	84.7	18.8	9 25 8.7	50.1	30.9	20
50	1 18 16.5	99.5	4.0	5 59 15.3	84.6	18.9	9 25 58.8	49.8	30.9	10
8 0	1 19 56.0	99.4	4.1	6 0 39.9	84.4	19.0	9 26 48.6	49.6	31.0	22 0
10	1 21 35.4	99.4	4.1	6 2 4.3	84.2	19.0	9 27 38.2	49.4	31.0	21 50
20	1 23 14.8	99.4	4.2	6 3 28.5	84.0	19.1	9 28 27.6	49.2	31.1	40
30	1 24 54.2	99.3	4.3	6 4 52.5	83.9	19.2	9 29 16.8	48.9	31.1	30
40	1 26 33.5	99.3	4.4	6 6 16.4	83.8	19.3	9 30 5.7	48.7	31.2	20
50	1 28 12.8	99.4	4.5	6 7 40.2	83.6	19.3	9 30 54.4	48.4	31.2	10
9 0	1 29 52.2	99.2	4.6	6 9 3.8	83.5	19.4	9 31 42.8	48.2	31.3	21 0
10	1 31 31.4	99.2	4.7	6 10 27.3	83.4	19.5	9 32 31.0	48.0	31.3	20 50
20	1 33 10.6	99.2	4.8	6 11 50.7	83.2	19.6	9 33 19.0	47.7	31.4	40
30	1 34 49.8	99.2	4.9	6 13 13.9	83.1	19.6	9 34 6.7	47.4	31.4	30
40	1 36 29.0	99.1	5.0	6 14 37.0	83.0	19.7	9 34 54.1	47.1	31.5	20
50	1 38 8.1	99.1	5.1	6 16 0.0	82.8	19.8	9 35 41.2	46.9	31.5	10
10 0	1 39 47.2	99.1	5.2	6 17 22.8	82.6	19.9	9 36 28.1	46.6	31.6	20 0
10	1 41 26.3	99.0	5.2	6 18 45.4	82.5	19.9	9 37 14.7	46.4	31.6	19 50
20	1 43 5.3	98.9	5.3	6 20 7.9	82.4	20.0	9 38 1.1	46.2	31.7	40
30	1 44 44.2	98.9	5.3	6 21 30.3	82.2	20.1	9 38 47.3	45.9	31.7	30
40	1 46 23.1	98.9	5.4	6 22 52.5	82.0	20.2	9 39 33.2	45.7	31.8	20
50	1 48 2.0	98.8	5.5	6 24 14.5	81.8	20.2	9 40 18.9	45.5	31.8	10
11 0	1 49 40.8	98.8	5.6	6 25 36.3	81.7	20.3	9 41 4.4	45.2	31.9	19 0
10	1 51 19.6	98.8	5.6	6 26 58.0	81.6	20.4	9 41 49.6	44.9	31.9	18 50
20	1 52 58.4	98.8	5.7	6 28 19.6	81.5	20.5	9 42 34.5	44.6	32.0	40
30	1 54 37.2	98.7	5.8	6 29 41.1	81.4	20.5	9 43 19.1	44.4	32.0	30
40	1 56 15.9	98.7	5.9	6 31 2.5	81.2	20.6	9 44 3.5	43.2	32.1	20
50	1 57 54.6	98.6	6.0	6 32 23.7	81.0	20.7	9 44 47.7	43.9	32.1	10
12 0	1 59 33.2		6.1	6 33 44.8		20.8	9 45 31.6		32.2	18 0
	Sig. XI. +			Sig. X. +			Sig. IX. +			

TABLE VII. Equation of the Centre of Mars for Jan. 1, 1800, with the Secular Variation, to be applied to the Longitude.

Argument. The mean Anomaly of Mars, or mean Longitude of Mars – Longitude of the Aphelion.

Deg.	Sig. III. –	Diff.	Var. –	Sig. IV. –	Diff.	Var. –	Sig. V. –	Diff.	Var. –	Deg.
	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	
6 0	10 41 32.0	1.2	37.0	9 14 6.5	60.2	34.0	4 51 13.7	111.3	18.7	24 0
10	10 41 33.2	0.9	37.0	9 13 6.3	60.6	34.0	4 49 22.4	111.5	18.6	23 50
20	10 41 34.1	0.5	37.0	9 12 5.7	60.9	33.9	4 47 30.9	111.7	18.5	40
30	10 41 34.6	0.2	37.0	9 11 4.8	61.2	33.9	4 45 39.2	111.9	18.4	30
40	10 41 34.8	0.2	37.0	9 10 3.6	61.5	33.8	4 43 47.3	112.2	18.3	20
50	10 41 34.6	0.5	37.0	9 9 2.1	61.8	33.8	4 41 55.1	112.4	18.2	10
7 0	10 41 34.1	0.8	37.1	9 8 0.3	62.2	33.7	4 40 2.7	112.5	18.0	23 0
10	10 41 33.3	1.1	37.1	9 6 58.1	62.5	33.7	4 38 10.2	112.7	17.9	22 50
20	10 41 32.2	1.4	37.1	9 5 55.6	62.9	33.6	4 36 17.5	112.9	17.8	40
30	10 41 30.8	1.7	37.1	9 4 52.7	63.3	33.6	4 34 24.6	113.1	17.7	30
40	10 41 29.1	2.1	37.1	9 3 49.4	63.6	33.5	4 32 31.5	113.3	17.6	20
50	10 41 27.0	2.4	37.1	9 2 45.8	63.8	33.4	4 30 38.2	113.6	17.5	10
8 0	10 41 24.6	2.7	37.2	9 1 42.0	64.2	33.3	4 28 44.6	113.7	17.3	22 0
10	10 41 21.9	3.0	37.2	9 0 37.8	64.5	33.3	4 26 50.9	113.9	17.2	21 50
20	10 41 18.9	3.4	37.2	8 59 33.3	64.8	33.2	4 24 57.0	114.0	17.1	40
30	10 41 15.5	3.8	37.2	8 58 28.5	65.2	33.2	4 23 3.0	114.2	17.0	30
40	10 41 11.7	4.1	37.2	8 57 23.3	65.6	33.1	4 21 8.8	114.4	16.9	20
50	10 41 7.6	4.5	37.2	8 56 17.7	65.9	33.1	4 19 14.2	114.6	16.8	10
9 0	10 41 3.1	4.8	37.2	8 55 11.8	66.2	33.0	4 17 19.8	114.8	16.6	21 0
10	10 40 58.3	5.1	37.2	8 54 5.6	66.5	32.9	4 15 25.0	115.0	16.5	20 50
20	10 40 53.2	5.4	37.2	8 52 59.1	66.8	32.9	4 13 30.0	115 1	16.4	40
30	10 40 47.8	5.7	37.2	8 51 52.3	67.2	32.8	4 11 34.9	115.3	16.2	30
40	10 40 42.1	6.1	37.2	8 50 45.1	67.6	32.8	4 9 36.6	115.5	16.1	20
50	10 40 36.0	6.4	37.2	8 49 37.5	67.9	32.7	4 7 44.1	115.8	16.0	10
10 0	10 40 29.6	6.7	37.3	8 48 29.6	68.2	32.7	4 5 48.3	115.9	15.8	20 0
10	10 40 22.9	7.1	37.3	8 47 21.4	68.5	32.6	4 3 52.4	116.0	15.7	19 50
20	10 40 15.8	7.4	37.3	8 46 12.9	68.9	32.6	4 1 56.4	116.2	15.6	40
30	10 40 8.4	7.7	37.3	8 45 4.0	69.2	32.5	4 0 0.2	116.4	15.5	30
40	10 40 0.7	8.1	37.3	8 43 54.8	69.5	32.4	3 58 3.8	116.5	15.4	20
50	10 39 52.6	8.4	37.3	8 42 45.3	69.8	32.3	3 56 7.3	116.7	15.3	10
11 0	10 39 44.2	8.7	37.3	8 41 35.5	70.1	32.3	3 54 10.6	116.9	15.1	19 0
10	10 39 35.5	9.1	37.3	8 40 25.4	70.5	32.2	3 52 13.7	117.1	15.0	18 50
20	10 39 26.4	9.4	37.3	8 39 14.9	70.8	32.1	3 50 16.6	117.2	14.9	40
30	10 39 17.0	9.8	37.3	8 38 4.1	71.2	32.1	3 48 19.4	117.3	14.8	30
40	10 39 7.2	10.1	37.3	8 36 52.9	71.5	32.0	3 46 22.1	117.5	14.7	20
50	10 38 57.1	10.5	37.3	8 35 41.4	71.8	31.9	3 44 24.6	117.7	14.6	10
12 0	10 38 46.6		37.4	8 34 29.6		31.8	3 42 26.9		14.4	18 0
	Sig. VIII. +			Sig. VII. +			Sig. VI. +			

TABLE VII. Equation of the Centre of Mars for Jan. 1, 1800, with the Secular Variation, to be applied to the Longitude.

Argument. The mean Anomaly of Mars, or mean Longitude of Mars — Longitude of the Aphelion.										
Deg.	Sig. O. —	Diff.	Var. —	Sig. I. —	Diff.	Var. —	Sig. II. —	Diff.	Var. —	Deg.
	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	
12 0	1 59 33.2	98.5	6.1	6 33 44.8	80.9	20.8	9 45 31.6	43.6	32.2	18 0
10	2 1 11.7	98.5	6.2	6 35 5.7	80.7	20.9	9 46 15.2	43.3	32.2	17 50
20	2 2 50.2	98.5	6.3	6 36 26.4	80.6	21.0	9 46 58.5	43.1	32.3	40
30	2 4 28.7	98.4	6.4	6 37 47.0	80.4	21.0	9 47 41.6	42.8	32.4	30
40	2 6 7.1	98.4	6.5	6 39 7.4	80.2	21.1	9 48 24.4	42.5	32.4	20
50	2 7 45.5	98.4	6.6	6 40 27.6	80.0	21.2	9 49 6.9	42.2	32.5	10
13 0	2 9 23.9	98.3	6.7	6 41 47.6	79.9	21.3	9 49 49.1	42.0	32.5	17 0
10	2 11 2.2	98.3	6.8	6 43 7.5	79.7	21.3	9 50 31.1	41.7	32.6	16 50
20	2 12 40.5	98.2	6.9	6 44 27.2	79.6	21.4	9 51 12.8	41.5	32.6	40
30	2 14 18.7	98.1	7.0	6 45 46.8	79.4	21.5	9 51 54.3	41.3	32.7	30
40	2 15 56.8	98.1	7.1	6 47 6.2	79.3	21.6	9 52 35.6	41.1	32.7	20
50	2 17 34.9	98.1	7.2	6 48 25.5	79.1	21.6	9 53 16.7	40.8	32.8	10
14 0	2 19 13.0	98.0	7.3	6 49 44.6	78.9	21.7	9 53 57.5	40.5	32.8	16 0
10	2 20 51.0	97.9	7.3	6 51 3.5	78.8	21.7	9 54 38.0	40.2	32.9	15 50
20	2 22 28.9	97.9	7.4	6 52 22.3	78.7	21.8	9 55 18.2	39.9	32.9	40
30	2 24 6.8	97.9	7.5	6 53 41.0	78.5	21.9	9 55 58.1	39.6	32.9	30
40	2 25 44.7	97.8	7.6	6 54 59.5	78.4	21.9	9 56 37.7	39.4	33.0	20
50	2 27 22.5	97.7	7.7	6 56 17.9	78.3	22.1	9 57 17.1	39.2	33.0	10
15 0	2 29 0.2	97.6	7.8	6 57 36.2	78.1	22.2	9 57 56.3	38.9	33.1	15 0
10	2 30 37.8	97.5	7.8	6 58 54.3	77.9	22.2	9 58 35.2	38.6	33.1	14 50
20	2 32 15.3	97.5	7.9	7 0 12.2	77.7	22.3	9 59 13.8	38.3	33.2	40
30	2 33 52.8	97.5	7.9	7 1 29.9	77.5	22.4	9 59 52.1	38.0	33.2	30
40	2 35 30.3	97.5	8.0	7 2 47.4	77.2	22.4	10 0 30.1	37.8	33.2	20
50	2 37 7.8	97.4	8.1	7 4 4.6	77.0	22.5	10 1 7.9	37.5	33.3	10
16 0	2 38 45.2	97.3	8.2	7 5 21.6	76.9	22.5	10 1 45.4	37.2	33.3	14 0
10	2 40 22.5	97.3	8.2	7 6 38.5	76.8	22.5	10 2 22.6	36.9	33.3	13 50
20	2 41 59.8	97.3	8.3	7 7 55.3	76.7	22.6	10 2 59.5	36.7	33.4	40
30	2 43 37.1	97.2	8.4	7 9 12.0	76.6	22.7	10 3 36.2	36.4	33.4	30
40	2 45 14.3	97.1	8.5	7 10 28.6	76.4	22.8	10 4 12.6	36.1	33.5	20
50	2 46 51.4	97.0	8.6	7 11 45.0	76.1	22.9	10 4 48.7	35.9	33.5	10
17 0	2 48 28.4	96.9	8.7	7 13 1.1	75.9	23.0	10 5 24.6	35.6	33.6	13 0
10	2 50 5.3	96.9	8.7	7 14 17.0	75.8	23.1	10 6 0.2	35.3	33.6	12 50
20	2 51 42.2	96.8	8.8	7 15 32.8	75.6	23.1	10 6 35.5	35.0	33.7	40
30	2 53 19.0	96.8	8.9	7 16 48.4	75.5	23.2	10 7 10.5	34.8	33.7	30
40	2 54 55.8	96.8	9.0	7 18 3.9	75.3	23.3	10 7 45.3	34.5	33.7	20
50	2 56 32.6	96.7	9.1	7 19 19.2	75.2	23.3	10 8 19.8	34.2	33.8	10
18 0	2 58 9.3		9.2	7 20 34.4		23.4	10 8 54.0		33.8	12 0
	Sig. XI. +			Sig. X. +			Sig. IX. +			

TABLE VII. Equation of the Centre of Mars, for Jan. 1, 1800, with the Secular Variation, to be applied to the Longitude.

Argument. The mean Anomaly of Mars, or mean Longitude of Mars — Longitude of the Aphelion.

Deg.	Sig. III. —	Diff.	Var. —	Sig. IV. —	Diff.	Var. —	Sig. V. —	Diff.	Var. —	Deg.
	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	
12 0	10 38 46.6	10.8	37.4	8 34 29.6	72.1	31.8	3 42 26.9	117.8	14.4	18 0
10	10 38 35.8	11.1	37.4	8 33 17.5	72.4	31.8	3 40 29.1	118.0	14.2	17 50
20	10 38 24.7	11.4	37.4	8 32 5.1	72.8	31.7	3 38 31.1	118.2	14.1	40
30	10 38 13.3	11.7	37.4	8 30 52.3	73.1	31.6	3 36 32.9	118.3	14.0	30
40	10 38 1.6	12.1	37.4	8 29 39.2	73.4	31.5	3 34 34.6	118.5	13.9	20
50	10 37 49.5	12.4	37.4	8 28 25.8	73.7	31.4	3 32 36.1	118.7	13.8	10
13 0	10 37 37.1	12.8	37.4	8 27 12.1	74.0	31.4	3 30 37.4	118.8	13.6	17 0
10	10 37 24.3	13.1	37.4	8 25 58.1	74.3	31.3	3 28 38.6	119.0	13.5	16 50
20	10 37 11.2	13.5	37.4	8 24 43.8	74.6	31.2	3 26 39.6	119.1	13.4	40
30	10 36 57.7	13.8	37.4	8 23 29.2	75.0	31.2	3 24 40.5	119.2	13.2	30
40	10 36 43.9	14.1	37.4	8 22 14.2	75.3	31.1	3 22 41.3	119.3	13.1	20
50	10 36 29.8	14.4	37.4	8 20 58.9	75.7	31.0	3 20 42.0	119.4	13.0	10
14 0	10 36 15.4	14.7	37.4	8 19 43.2	76.0	31.0	3 18 42.6	119.6	12.9	16 0
10	10 36 0.7	15.1	37.4	8 18 27.2	76.3	30.9	3 16 43.0	119.7	12.7	15 50
20	10 35 45.6	15.5	37.4	8 17 10.9	76.6	30.8	3 14 43.3	119.9	12.6	40
30	10 35 30.1	15.8	37.4	8 15 54.3	76.9	30.8	3 12 43.4	120.1	12.4	30
40	10 35 14.3	16.2	37.4	8 14 37.4	77.2	30.7	3 10 43.3	120.3	12.2	20
50	10 34 58.1	16.6	37.4	8 13 20.2	77.5	30.6	3 8 43.0	120.4	12.1	10
15 0	10 34 41.5	16.9	37.4	8 12 2.7	77.8	30.6	3 6 42.6	120.5	12.0	15 0
10	10 34 24.6	17.2	37.4	8 10 44.9	78.1	30.5	3 4 42.1	120.6	11.9	14 50
20	10 34 7.4	17.6	37.4	8 9 26.8	78.5	30.5	3 2 41.5	120.7	11.8	40
30	10 33 49.8	17.9	37.4	8 8 8.3	78.8	30.4	3 0 40.8	120.8	11.7	30
40	10 33 31.9	18.2	37.4	8 6 49.5	79.1	30.3	2 58 40.0	121.0	11.6	20
50	10 33 13.7	18.5	37.4	8 5 30.4	79.4	30.2	2 56 39.0	121.1	11.5	10
16 0	10 32 55.2	18.8	37.3	8 4 11.0	79.7	30.2	2 54 37.9	121.2	11.3	14 0
10	10 32 36.4	19.2	37.3	8 2 51.3	80.0	30.1	2 52 36.7	121.4	11.1	13 50
20	10 32 17.2	19.6	37.3	8 1 31.3	80.4	30.0	2 50 35.3	121.5	11.0	40
30	10 31 57.6	19.9	37.3	8 0 10.9	80.7	29.9	2 48 33.8	121.6	10.9	30
40	10 31 37.7	20.3	37.3	7 58 50.2	81.0	29.9	2 46 32.2	121.8	10.7	20
50	10 31 17.4	20.7	37.3	7 57 29.2	81.3	29.8	2 44 30.4	121.9	10.6	10
17 0	10 30 56.7	21.0	37.3	7 56 7.9	81.6	29.7	2 42 28.5	122.0	10.5	13 0
10	10 30 35.7	21.3	37.3	7 54 46.3	81.9	29.6	2 40 26.5	122.1	10.4	12 50
20	10 30 14.4	21.6	37.3	7 53 24.4	82.2	29.6	2 38 24.4	122.2	10.2	40
30	10 29 52.8	22.0	37.3	7 52 2.2	82.5	29.5	2 36 22.2	122.3	10.1	30
40	10 29 30.8	22.3	37.3	7 50 39.7	82.8	29.4	2 34 19.9	122.4	10.0	20
50	10 29 8.5	22.6	37.3	7 49 16.9	83.1	29.4	2 32 17.5	122.5	9.9	10
18 0	10 28 45.9		37.3	7 47 53.8		29.3	2 30 15.0		9.7	12 0
	Sig. VIII. +			Sig. VII. +			Sig. VI. +			

TABLE VII. Equation of the Centre of Mars for Jan. 1, 1800, with the Secular Variation, to be applied to the Longitude.

Argument. The mean Anomaly of Mars, or mean Longitude of Mars — Longitude of the Aphelion.

Deg.	Sig. O. —	Diff.	Var. —	Sig. I. —	Diff.	Var. —	Sig. II. —	Diff.	Var. —	Deg.
	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	
18 0	2 58 9.3	96.7	9.2	7 20 34.4	75.0	23.4	10 8 54.0	33.9	33.8	12 0
10	2 59 46.0	96.6	9.3	7 21 49.4	74.8	23.5	10 9 27.9	33.7	33.8	11 50
20	3 1 22.6	96.4	9.4	7 23 4.2	74.6	23.5	10 10 1.6	33.4	33.9	40
30	3 2 59.0	96.3	9.5	7 24 18.8	74.4	23.6	10 10 35.0	33.1	33.9	30
40	3 4 35.3	96.2	9.6	7 25 33.2	74.2	23.6	10 11 8.1	32.8	34.0	20
50	3 6 11.5	96.2	9.6	7 26 47.4	74.0	23.7	10 11 40.9	32.5	34.0	10
19 0	3 7 47.7	96.2	9.7	7 28 1.4	73.9	23.8	10 12 13.4	32.3	34.1	11 0
10	3 9 23.9	96.1	9.8	7 29 15.3	73.8	23.9	10 12 45.7	32.0	34.1	10 50
20	3 11 0.1	96.1	9.9	7 30 29.1	73.6	24.0	10 13 17.7	31.7	34.2	40
30	3 12 36.2	96.0	10.0	7 31 42.7	73.4	24.1	10 13 49.4	31.4	34.2	30
40	3 14 12.2	95.9	10.1	7 32 56.1	73.2	24.1	10 14 20.8	31.1	34.3	20
50	3 15 48.1	95.9	10.2	7 34 9.3	72.9	24.2	10 14 51.9	30.9	34.3	10
20 0	3 17 24.0	95.8	10.3	7 35 22.2	72.8	24.3	10 15 22.8	30.6	34.4	10 0
10	3 18 59.8	95.6	10.3	7 36 35.0	72.6	24.3	10 15 53.4	30.3	34.4	9 50
20	3 20 35.4	95.5	10.4	7 37 47.6	72.5	24.4	10 16 23.7	30.0	34.4	40
30	3 22 10.9	95.5	10.5	7 39 0.1	72.3	24.5	10 16 53.7	29.7	34.5	30
40	3 23 46.4	95.5	10.6	7 40 12.4	72.1	24.5	10 17 23.4	29.4	34.5	20
50	3 25 21.9	95.4	10.6	7 41 24.5	71.9	24.6	10 17 52.8	29.2	34.6	10
21 0	3 26 57.3	95.4	10.7	7 42 36.4	71.7	24.7	10 18 22.0	28.8	34.6	9 0
10	3 28 32.7	95.4	10.8	7 43 48.1	71.5	24.8	10 18 50.8	28.5	34.7	8 50
20	3 30 8.1	95.3	10.9	7 44 59.6	71.3	24.8	10 19 19.3	28.2	34.7	40
30	3 31 43.4	95.2	11.0	7 46 10.9	71.1	24.9	10 19 47.5	28.0	34.7	30
40	3 33 18.6	95.2	11.1	7 47 22.0	70.9	25.0	10 20 15.5	27.7	34.8	20
50	3 34 53.8	95.1	11.1	7 48 32.9	70.6	25.0	10 20 43.2	27.4	34.8	10
22 0	3 36 28.9	94.8	11.2	7 49 43.5	70.5	25.1	10 21 10.6	27.1	34.8	8 0
10	3 38 3.7	94.7	11.3	7 50 54.0	70.3	25.2	10 21 37.7	26.8	34.8	7 50
20	3 39 38.4	94.5	11.4	7 52 4.3	70.2	25.2	10 22 4.5	26.5	34.9	40
30	3 41 12.9	94.4	11.5	7 53 14.5	70.0	25.3	10 22 31.0	26.2	34.9	30
40	3 42 47.3	94.3	11.6	7 54 24.5	69 9	25.3	10 22 57.2	26.0	34.9	20
50	3 44 21.6	94.3	11.6	7 55 34.4	69.8	25.4	10 23 23.2	25.7	35.0	10
23 0	3 45 55.9	94.3	11.7	7 56 44.2	69.5	25.5	10 23 48.9	25.4	35.0	7 0
10	3 47 30.2	94.2	11.8	7 57 53.7	69.3	25.5	10 24 14.3	25.1	35.0	6 50
20	3 49 4.4	94.2	11.9	7 59 3.0	69.1	25.6	10 24 39.4	24.8	35.1	40
30	3 50 38.6	94.1	12.0	8 0 12.1	68.8	25.7	10 25 4.2	24.5	35.1	30
40	3 52 12.7	94.0	12.1	8 1 20.9	68.5	25.7	10 25 28.7	24.2	35.2	20
50	3 53 46.7	93.9	12.1	8 2 29.4	68.3	25.8	10 25 52.9	23.9	35.2	10
24 0	3 55 20.6		12.2	8 3 37.7		25.9	10 26 16.8		35.3	6 0
	Sig. XI. +			Sig. X. +			Sig. IX. +			

TABLE VII. Equation of the Centre of Mars for Jan. 1, 1800, with the Secular Variation, to be applied to the Longitude.

Argument. The mean Anomaly of Mars, or mean Longitude of Mars — Longitude of the Aphelion.

Deg.	Sig. III. —	Diff.	Var. —	Sig IV. —	Diff.	Var. —	Sig. V. —	Diff.	Var. —	Deg.
	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	
18 0	10 28 45.9	22.9	37.3	7 47 53.8	83.4	29.3	2 30 15.0	122.6	9.7	12 0
10	10 28 23.0	23.3	37.3	7 46 30.4	83.7	29.3	2 28 12.4	122.7	9.6	11 50
20	10 27 59.7	23.7	37.3	7 45 6.7	84.1	29.2	2 26 9.7	122.8	9.5	40
30	10 27 36.0	24.1	37.3	7 43 42.6	84.3	29.1	2 24 6.9	122.9	9.3	30
40	10 27 11.9	24.4	37.3	7 42 18.3	84.6	29.0	2 22 4.0	123.1	9.2	20
50	10 26 47.5	24.8	37.3	7 40 53.7	84.9	28.9	2 20 0.9	123.3	9.1	10
19 0	10 26 22.7	25.1	37.2	7 39 28.8	85.2	28.8	2 17 57.6	123.3	8.9	11 0
10	10 25 57.6	25.4	37.2	7 38 3.6	85.5	28.8	2 15 54.3	123.4	8.8	10 50
20	10 25 32.2	25.7	37.2	7 36 38.1	85.8	28.7	2 13 50.9	123.5	8.6	40
30	10 25 6.5	26.1	37.2	7 35 12.3	86.1	28.6	2 11 47.4	123.6	8.5	30
40	10 24 40.4	26.4	37.2	7 33 46.2	86.5	28.5	2 9 43.8	123.6	8.4	20
50	10 24 14.0	26.8	37.2	7 32 19.7	86.8	28.4	2 7 40.2	123.7	8.2	10
20 0	10 23 47.2	27.1	37.1	7 30 52.9	87.0	28.4	2 5 36.5	123.8	8.1	10 0
10	10 23 20.1	27.4	37.1	7 29 25.9	87.4	28.3	2 3 32.7	123.9	8.0	9 50
20	10 22 52.7	27.8	37.1	7 27 58.5	87.6	28.2	2 1 28.8	124.0	7.8	40
30	10 22 24.9	28.2	37.1	7 26 30.9	87.9	28.1	1 59 24.8	124.1	7.7	30
40	10 21 56.7	28.6	37.1	7 25 3.0	88.2	28.0	1 57 20.7	124.2	7.6	20
50	10 21 28.1	28.9	37.1	7 23 34.8	88.5	27.9	1 55 16.5	124.2	7.4	10
21 0	10 20 59.2	29.2	37.0	7 22 6.3	88.8	27.8	1 53 12.3	124.3	7.3	9 0
10	10 20 30.0	29.6	37.0	7 20 37.5	89.1	27.7	1 51 8.0	124.4	7.2	8 50
20	10 20 0.4	29.9	37.0	7 19 8.4	89.3	27.6	1 49 3.6	124.5	7.1	40
30	10 19 30.5	30.3	37.0	7 17 39.1	89.6	27.5	1 46 59.1	124.6	6.9	30
40	10 19 0.2	30.6	37.0	7 16 9.5	89.9	27.4	1 44 54.5	124.7	6.8	20
50	10 18 29.6	30.9	37.0	7 14 39.6	90.2	27.3	1 42 49.8	124.7	6.6	10
22 0	10 17 58.7	31.3	36.9	7 13 9.4	90.5	27.2	1 40 45.1	124.7	6.5	8 0
10	10 17 27.4	31.7	36.9	7 11 38.9	90.8	27.2	1 38 40.4	124.8	6.4	7 50
20	10 16 55.7	32.0	36.9	7 10 8.1	91.1	27.1	1 36 35.6	124.9	6.2	40
30	10 16 23.7	32.3	36.9	7 8 37.0	91.4	27.0	1 34 30.7	125.0	6.1	30
40	10 15 51.4	32.6	36.9	7 7 5.6	91.6	26.9	1 32 25.7	125.2	6.0	20
50	10 15 18.8	33.0	36.9	7 5 34.0	91.9	26.8	1 30 20.5	125.3	5.9	10
23 0	10 14 45.8	33.3	36.8	7 4 2.1	92.2	26.7	1 28 15.2	125.3	5.7	7 0
10	10 14 12.5	33.6	36.8	7 2 29.9	92.5	26.6	1 26 9.9	125.3	5.6	6 50
20	10 13 38.9	34.0	36.8	7 0 57.4	92.8	26.5	1 24 4.6	125.3	5.4	40
30	10 13 4.9	34.4	36.8	6 59 24.6	93.1	26.4	1 21 59.3	125.4	5.3	30
40	10 12 30.5	34.8	36.8	6 57 51.5	93.3	26.3	1 19 53.9	125.4	5.2	20
50	10 11 55.7	35.1	36.8	6 56 18.2	93.6	26.2	1 17 48.5	125.4	5.1	10
24 0	10 11 20.6		36.7	6 54 44.6		26.2	1 15 43.1		4.9	6 0
	Sig. VIII. +			Sig. VII. +			Sig. VI. +			

TABLE VII. Equation of the Centre of Mars for Jan. 1, 1800, with the Secular Variation, to be applied to the Longitude.

Argument. The mean Anomaly of Mars, or mean Longitude of Mars — Longitude of the Aphelion.

Deg.	Sig. O. — D. M. S.	Diff. SEC.	Var. — SEC.	Sig. I. — D. M. S.	Diff. SEC.	Var. — SEC.	Sig. II. — D. M. S.	Diff. SEC.	Var. — SEC.	Deg.
24 0	3 55 20.6	93.8	12.2	8 3 37.7	68.2	25.9	10 26 16.8	23.6	35.3	6 0
10	3 56 54.4	93.8	12.3	8 4 45.9	68.0	25.9	10 26 40.4	23.3	35.3	5 50
20	3 58 28.2	93.7	12.4	8 5 53.0	67.9	26.1	10 27 3.7	23.0	35.3	40
30	4 0 1.9	93.6	12.5	8 7 1.8	67.7	26.1	10 27 26.7	22.7	35.4	30
40	4 1 35.5	93.5	12.6	8 8 9.5	67.5	26.1	10 27 49.4	22.5	35.4	20
50	4 3 9.0	93.4	12.7	8 9 17.0	67.4	26.1	10 28 11.9	22.1	35.4	10
25 0	4 4 42.4	93.3	12.8	8 10 24.4	67.2	26.3	10 28 34.0	21.8	35.5	5 0
10	4 6 15.7	93.2	12.8	8 11 31.6	67.0	26.3	10 28 55.8	21.5	35.5	4 50
20	4 7 48.9	93.1	12.9	8 12 38.6	66.7	26.3	10 29 17.3	21.2	35.5	40
30	4 9 22.0	93.0	12.9	8 13 45.3	66.4	26.5	10 29 38.5	20.9	35.6	30
40	4 10 55.0	92.9	13.0	8 14 51.7	66.2	26.5	10 29 59.4	20.6	35.6	20
50	4 12 27.9	92.9	13.1	8 15 57.9	65.9	26.5	10 30 20.0	20.3	35.6	10
26 0	4 14 0.8	92.8	13.2	8 17 3.8	65.8	26.7	10 30 40.3	20.0	35.7	4 0
10	4 15 33.6	92.7	13.2	8 18 9.6	65.6	26.7	10 31 0.3	19.7	35.7	3 50
20	4 17 6.3	92.6	13.3	8 19 15.2	65.4	26.9	10 31 20.0	19.4	35.7	40
30	4 18 38.9	92.5	13.4	8 20 20.6	65.3	26.9	10 31 39.4	19.1	35.8	30
40	4 20 11.4	92.3	13.5	8 21 25.9	65.1	26.9	10 31 58.5	18.8	35.8	20
50	4 21 43.7	92.2	13.6	8 22 31.0	64.8	26.9	10 32 17.3	18.5	35.8	10
27 0	4 23 15.9	92.1	13.7	8 23 35.8	64.6	27.1	10 32 35.8	18.1	35.9	3 0
10	4 24 48.0	92.0	13.7	8 24 40.4	64.4	27.1	10 32 53.9	17.8	35.9	2 50
20	4 26 20.0	92.0	13.8	8 25 44.8	64.2	27.3	10 33 11.7	17.5	35.9	40
30	4 27 52.0	91.9	13.9	8 26 49.0	64.0	27.3	10 33 29.2	17.3	36.0	30
40	4 29 23.9	91.8	14.0	8 27 53.0	63.8	27.3	10 33 46.5	17.0	36.0	20
50	4 30 55.7	91.7	14.1	8 28 56.8	63.6	27.3	10 34 3.5	16.8	36.0	10
28 0	4 32 27.4	91.6	14.2	8 30 0.4	63.4	27.5	10 34 20.3	16.4	36.1	2 0
10	4 33 59.0	91.5	14.2	8 31 3.8	63.2	27.5	10 34 36.7	16.1	36.1	1 50
20	4 35 30.5	91.4	14.3	8 32 7.0	63.0	27.5	10 34 52.8	15.7	36.1	40
30	4 37 1.9	91.3	14.4	8 33 10.0	62.7	27.7	10 35 8.5	15.4	36.2	30
40	4 38 33.2	91.1	14.5	8 34 12.7	62.5	27.7	10 35 23.9	15.2	36.2	20
50	4 40 4.3	91.0	14.6	8 35 15.2	62.2	27.7	10 35 39.1	14.9	36.2	10
29 0	4 41 35.3	90.9	14.7	8 36 17.4	62.0	27.9	10 35 54.0	14.6	36.3	1 0
10	4 43 6.2	90.8	14.7	8 37 19.4	61.8	27.9	10 36 8.6	14.3	36.3	0 50
20	4 44 37.0	90.7	14.8	8 38 21.2	61.6	28.0	10 36 22.9	13.9	36.3	40
30	4 46 7.7	90.7	14.9	8 39 22.8	61.5	28.0	10 36 36.8	13.5	36.4	30
40	4 47 38.4	90.6	15.0	8 40 24.3	61.3	28.1	10 36 50.3	13.2	36.4	20
50	4 49 9.0	90.5	15.1	8 41 25.6	61.2	28.1	10 37 3.5	12.9	36.4	10
30 0	4 50 39.5		15.2	8 42 26.8		28.2	10 37 16.4		36.4	0 0
	Sig. XI. +			Sig. X. +			Sig. IX. +			

TABLE VII. Equation of the Centre of Mars for Jan. 1, 1800, with the Secular Variation, to be applied to the Longitude.

Argument. The mean Anomaly of Mars, or mean Longitude of Mars — Longitude of the Aphelion.

Deg.	Sig. III. —	Diff.	Var. —	Sig. IV. —	Diff.	Var. —	Sig. V. —	Diff.	Var. —	Deg.
	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	D. M. S.	SEC.	SEC.	
24 0	10 11 20.6		36.7	6 54 44.6		26.2	1 15 43.1		4.9	6 0
10	10 10 45.1	35.5	36.7	6 53 10.7	93.9	26.1	1 13 37.6	125.5	4.8	5 50
20	10 10 9.3	35.8	36.7	6 51 36.5	94.2	26.0	1 11 32.0	125.6	4.7	40
30	10 9 33.2	36.1	36.7	6 50 2.0	94.5	25.9	1 9 26.3	125.7	4.5	30
40	10 8 56.8	36.4	36.7	6 48 27.3	94.7	25.8	1 7 20.6	125.7	4.4	20
50	10 8 20.0	36.8	36.6	6 46 52.4	94.9	25.8	1 5 14.8	125.8	4.3	10
25 0	10 7 42.8	37.2	36.6	6 45 17.2	95.2	25.7	1 3 9.0	125.8	4.1	5 0
10	10 7 5.3	37.5	36.6	6 43 41.7	95.5	25.6	1 1 3.2	125.8	4.0	4 50
20	10 6 27.4	37.9	36.5	6 42 5.9	95.8	25.5	0 58 57.3	125.9	3.9	40
30	10 5 49.1	38.3	36.5	6 40 29.8	96.1	25.4	0 56 51.4	125.9	3.7	30
40	10 5 10.5	38.6	36.5	6 38 53.4	96.4	25.3	0 54 45.4	126.0	3.6	20
50	10 4 31.6	38.9	36.5	6 37 16.8	96.6	25.2	0 52 39.3	126.1	3.5	10
26 0	10 3 52.4	39.2	36.4	6 35 39.9	96.9	25.1	0 50 33.2	126.1	3.3	4 0
10	10 3 12.8	39.6	36.4	6 34 2.7	97.2	25.0	0 48 27.1	126.1	3.2	3 50
20	10 2 32.9	39.9	36.3	6 32 25.3	97.4	24.9	0 46 21.0	126.1	3.1	40
30	10 1 52.6	40.3	36.3	6 30 47.6	97.7	24.8	0 44 14.8	126.2	2.9	30
40	10 1 11.9	40.7	36.3	6 29 9.7	97.9	24.7	0 42 8.6	126.2	2.8	20
50	10 0 30.9	41.0	36.3	6 27 31.5	98.2	24.6	0 40 2.3	126.3	2.7	10
27 0	9 59 49.6	41.3	36.2	6 25 53.1	98.4	24.5	0 37 56.0	126.3	2.5	3 0
10	9 59 8.0	41.6	36.2	6 24 14.4	98.7	24.4	0 35 49.7	126.3	2.4	2 50
20	9 58 26.0	42.0	36.2	6 22 35.4	99.0	24.3	0 33 43.4	126.3	2.3	40
30	9 57 43.6	42.4	36.1	6 20 56.1	99.3	24.2	0 31 37.1	126.3	2.1	30
40	9 57 0.9	42.7	36.1	6 19 16.6	99.5	24.1	0 29 30.7	126.4	2.0	20
50	9 56 17.8	43.1	36.1	6 17 36.8	99.8	24.0	0 27 24.3	126.4	1.9	10
28 0	9 55 34.4	43.4	36.0	6 15 56.8	100.0	23.9	0 25 17.9	126.4	1.7	2 0
10	9 54 50.7	43.7	36.0	6 14 16.5	100.3	23.8	0 23 11.5	126.4	1.6	1 50
20	9 54 6.6	44.1	36.0	6 12 35.9	100.6	23.7	0 21 5.1	126.4	1.5	40
30	9 53 22.1	44.5	35.9	6 10 55.1	100.8	23.6	0 18 58.7	126.4	1.3	30
40	9 52 37.3	44.8	35.9	6 9 14.1	101.0	23.5	0 16 52.2	126.5	1.2	20
50	9 51 52.2	45.1	35.9	6 7 32.8	101.3	23.4	0 14 45.7	126.5	1.1	10
29 0	9 51 6.8	45.4	35.8	6 5 51.2	101.6	23.3	0 12 39.2	126.5	0.9	1 0
10	9 50 21.0	45.8	35.8	6 4 9.3	101.9	23.2	0 10 32.7	126.5	0.8	0 50
20	9 49 34.9	46.1	35.8	6 2 27.2	102.1	23.1	0 8 26.2	126.5	0.7	40
30	9 48 48.4	46.5	35.7	6 0 44.9	102.3	23.0	0 6 19.7	126.5	0.5	30
40	9 48 1.5	46.9	35.7	5 59 2.4	102.5	22.9	0 4 13.2	126.5	0.3	20
50	9 47 14.2	47.3	35.7	5 57 19.7	102.7	22.8	0 2 6.6	126.6	0.1	10
30 0	9 46 26.6	47.6	35.6	5 55 36.7	103.0	22.7	0 0 0.0	126.6	0.0	0 0
	Sig. VIII. +			Sig. VII. +			Sig. VI. +			

Table VIII.

Argument II. Long. ♂ − Long. ♃.

The Equations are all poſitive, but the Sum muſt be diminiſhed two Minutes.

Arg.	0	100	200	300	400	500	600	700	800	900
	″	″	″	″	″	″	″	″	″	″
0	35.0	34.8	19.0	3.2	8.7	35.0	61.3	66.8	51.0	35.2
10	35.4	33.9	17.0	2.7	10.6	38.1	63.0	65.9	49.0	34.5
20	35.8	32.8	15.0	2.3	12.8	41.1	64.4	64.9	47.0	34.0
30	36.2	31.5	13.0	2.3	15.0	44.1	65.7	63.6	45.2	33.6
40	36.4	30.0	11.1	2.3	17.6	47.0	66.6	62.2	43.3	33.4
50	36.6	28.5	9.4	2.7	20.2	49.8	67.3	60.6	41.5	33.4
60	36.6	26.7	7.8	3.4	23.0	52.4	67.7	58.9	39.9	33.6
70	36.4	24.8	6.4	4.3	25.9	55.0	67.7	57.0	38.5	33.8
80	36.0	23.0	5.1	5.6	28.9	57.2	67.7	55.0	37.2	33.2
90	35.5	21.0	4.1	7.0	31.9	59.4	67.3	53.0	36.1	34.6
100	34.8	19.0	3.2	8.7	35.0	61.3	66.8	51.0	35.2	35.0

Table IX.

Argument III. Long. ♂ − 2 Long. ♃.

Arg.	0	100	200	300	400	500	600	700	800	900
	″	″	″	″	″	″	″	″	″	″
0	18.4	31.3	43.6	50.9	50.1	41.6	28.7	16.4	9.1	9.9
10	19.6	32.6	44.6	51.1	49.5	40.4	27.4	15.4	8.9	10.5
20	20.7	33.9	45.6	51.3	48.8	39.3	26.1	14.4	8.7	11.3
30	22.0	35.2	46.5	51.4	48.1	38.0	24.8	13.5	8.6	11.9
40	23.2	36.6	47.3	51.5	47.4	36.8	23.4	12.7	8.5	12.6
50	24.6	37.8	48.0	51.4	46.6	35.4	22.2	12.0	8.6	13.4
60	25.9	39.1	48.6	51.3	45.8	34.1	20.9	11.4	8.7	14.2
70	27.2	40.2	49.4	51.1	44.8	32.8	19.8	10.6	8.9	15.2
80	28.5	41.4	50.0	50.9	43.8	31.5	18.6	10.0	9.1	16.2
90	29.9	42.5	50.5	50.6	42.7	30.1	17.5	9.5	9.4	17.3
100	31.3	43.6	50.9	50.1	41.6	28.7	16.4	9.1	9.9	18.4

Table X.

Argument IV. 2 Long. ♂ − Long. ♃.										
Arg.	0	100	200	300	400	500	600	700	800	900
	″	″	″	″	″	″	″	″	″	″
0	6.8	7.3	7.0	5.9	4.5	3.2	2.7	3.0	4.1	5.5
10	6.9	7.3	6.9	5.8	4.3	3.1	2.7	3.1	4.2	5.7
20	7.0	7.3	6.8	5.6	4.2	3.0	2.7	3.2	4.4	5.8
30	7.0	7.3	6.7	5.5	4.1	3.0	2.7	3.3	4.5	5.9
40	7.1	7.3	6.6	5.3	3.9	2.9	2.7	3.4	4.7	6.1
50	7.2	7.3	6.5	5.2	3.8	2.8	2.7	3.5	4.8	6.2
60	7.2	7.2	6.4	5.0	3.7	2.8	2.8	3.6	5.0	6.3
70	7.2	7.2	6.3	4.9	3.5	2.8	2.8	3.7	5.1	6.5
80	7.3	7.1	6.2	4.8	3.4	2.7	2.9	3.8	5.2	6.6
90	7.3	7.1	6.1	4.6	3.3	2.7	2.9	3.9	5.4	6.7
100	7.3	7.0	5.9	4.5	3.2	2.7	3.0	4.1	5.5	6.8

Table XI.

Argument V. Long. ♃.										
Arg.	0	100	200	300	400	500	600	700	800	900
	″	″	″	″	″	″	″	″	″	″
0	8.6	7.7	5.7	3.5	1.9	1.4	2.4	4.3	6.5	8.1
10	8.6	7.5	5.4	3.3	1.8	1.5	2.5	4.6	6.7	8.2
20	8.5	7.3	5.2	3.1	1.7	1.5	2.7	4.8	6.9	8.3
30	8.5	7.1	5.0	2.9	1.6	1.6	2.9	5.0	7.1	8.4
40	8.4	6.9	4.8	2.7	1.5	1.7	3.1	5.2	7.3	8.5
50	8.3	6.7	4.6	2.5	1.5	1.8	3.3	5.4	7.5	8.5
60	8.2	6.5	4.3	2.4	1.4	1.9	3.5	5.7	7.6	8.6
70	8.1	6.3	4.1	2.3	1.4	2.0	3.7	5.9	7.7	8.6
80	8.0	6.1	3.9	2.1	1.4	2.1	3.9	6.1	7.9	8.6
90	7.9	5.9	3.7	2.0	1.4	2.3	4.1	6.3	8.0	8.6
100	7.7	5.7	3.5	1.9	1.4	2.4	4.3	6.5	8.1	8.6

Table XII.

Argument VI. Long. ⊖ — Long. ♂.										
Arg.	0	100	200	300	400	500	600	700	800	900
	″	″	″	″	″	″	″	″	″	″
0	10.0	13.2	16.5	17.3	15.2	10.0	4.8	2.7	3.5	6.8
10	10.4	13.5	16.7	17.2	14.7	9.4	4.4	2.7	3.8	7.1
20	10.7	13.8	16.8	17.2	14.3	8.9	4.1	2.7	4.2	7.5
30	11.0	14.1	17.0	17.1	13.8	8.3	3.8	2.7	4.5	7.8
40	11.3	14.4	17.1	17.0	13.3	7.7	3.5	2.7	4.8	8.1
50	11.6	14.8	17.2	16.8	12.8	7.2	3.2	2.8	5.2	8.4
60	11.9	15.2	17.3	16.5	12.3	6.7	3.0	2.9	5.6	8.7
70	12.2	15.5	17.3	16.2	11.7	6.2	2.9	3.0	5.9	9.0
80	12.5	15.8	17.3	15.9	11.1	5.7	2.8	3.2	6.2	9.3
90	12.9	16.2	17.3	15.6	10.6	5.3	2.8	3.3	6.5	9.6
100	13.2	16.5	17.3	15.2	10.0	4.8	2.7	3.5	6.8	10.0

Table XIII.

Argument VII. 2 Long. ♂ — Long. ⊖.										
Arg.	0	100	200	300	400	500	600	700	800	900
	″	″	″	″	″	″	″	″	″	″
0	5.4	1.7	3.0	8.8	17.2	24.6	28.3	27.0	21.2	12.8
10	4.8	1.5	3.4	9.6	18.1	25.2	28.5	26.6	20.4	11.9
20	4.3	1.4	3.8	10.3	18.9	25.7	28.6	26.2	19.7	11.1
30	3.8	1.4	4.3	11.1	19.7	26.2	28.6	25.7	18.9	10.3
40	3.4	1.5	4.8	11.9	20.4	26.6	28.5	25.2	18.1	9.6
50	3.0	1.7	5.4	12.8	21.2	27.0	28.3	24.6	17.2	8.8
60	2.6	1.9	6.0	13.7	21.9	27.4	28.1	24.0	16.3	8.1
70	2.3	2.1	6.6	14.5	22.7	27.7	27.9	23.4	15.5	7.3
80	2.1	2.3	7.3	15.5	23.4	27.9	27.7	22.7	14.5	6.6
90	1.9	2.6	8.1	16.3	24.0	28.1	27.4	21.9	13.7	6.0
100	1.7	3.0	8.8	17.2	24.6	28.3	27.0	21.2	12.8	5.4

Table XIV.

Argument VIII. 2 Long. ⊖ − 3 Long. ♂.										
Arg.	0	100	200	300	400	500	600	700	800	900
	″	″	″	″	″	″	″	″	″	″
0	6.5	10.1	13.7	15.9	15.9	13.5	9.9	6.3	4.1	4.1
10	6.8	10.5	14.0	16.0	15.7	13.2	9.5	6.0	4.0	4.3
20	7.1	10.9	14.3	16.0	15.5	12.9	9.1	5.7	4.0	4.5
30	7.5	11.2	14.5	16.1	15.3	12.5	8.8	5.5	3.9	4.7
40	7.9	11.6	14.8	16.2	15.1	12.2	8.4	5.2	3.8	4.9
50	8.3	11.9	15.1	16.2	14.9	11.8	8.1	4.9	3.8	5.1
60	8.6	12.4	15.3	16.2	14.6	11.4	7.7	4.7	3.8	5.4
70	9.0	12.7	15.5	16.1	14.3	11.0	7.3	4.5	3.9	5.7
80	9.3	13.1	15.7	16.0	14.1	10.7	6.9	4.3	4.0	5.9
90	9.7	13.4	15.8	16.0	13.8	10.3	6.6	4.2	4.0	6.2
100	10.1	13.7	15.9	15.9	13.5	9.9	6.3	4.1	4.1	6.5

Table XV.

Argument IX. Long. ♀ − 3 Long. ♂.										
Arg.	0	100	200	300	400	500	600	700	800	900
	″	″	″	″	″	″	″	″	″	″
0	10.0	13.4	15.4	15.4	13.4	10.0	6.6	4.6	4.6	6.6
10	10.4	13.6	15.5	15.3	13.1	9.6	6.4	4.5	4.7	6.9
20	10.8	13.9	15.5	15.2	12.8	9.2	6.1	4.5	4.8	7.2
30	11.1	14.1	15.6	15.0	12.4	8.9	5.9	4.4	5.0	7.6
40	11.5	14.4	15.7	14.8	12.1	8.5	5.6	4.3	5.2	7.9
50	11.8	14.6	15.7	14.6	11.8	8.2	5.4	4.3	5.4	8.2
60	12.1	14.8	15.7	14.4	11.5	7.9	5.2	4.3	5.6	8.5
70	12.4	15.0	15.6	14.1	11.1	7.6	5.0	4.4	5.9	8.9
80	12.8	15.2	15.5	13.9	10.8	7.2	4.8	4.5	6.1	9.2
90	13.1	15.3	15.5	13.6	10.4	6.9	4.7	4.5	6.4	9.6
100	13.4	15.4	15.4	13.4	10.0	6.6	4.6	4.6	6.6	10.0

TABLE XVI. Logarithms of the Radius Vector of the Orbit of Mars for Jan. 1, 1800, with the Secular Variation.

Argument. The mean Anomaly of Mars.

Deg.	Sig. O.	Diff.	Sec. Var.	Sig. I.	Diff.	Sec. Var.	Sig. II.	Diff.	Sec. Var.	Deg.
0	0.221606	005	+ 35.8	0.217392	283	+ 31.7	0.205193	530	+ 21.8	30
1	0.221601	014	35.8	0.217109	292	31.5	0.204663	537	21.4	29
2	0.221587	023	35.8	0.216817	301	31.3	0.204126	543	21.0	28
3	0.221564	033	35.7	0.216516	310	31.0	0.203583	551	20.6	27
4	0.221531	043	35.7	0.216206	318	30.8	0.203032	558	20.1	26
5	0.221488		35.6	0.215888		30.5	0.202474		19.6	25
		051			328			565		
6	0.201437	062	35.6	0.215560	336	30.2	0.201909	571	19.1	24
7	0.221375	070	35.5	0.215224	345	30.0	0.201338	578	18.6	23
8	0.221305	081	35.4	0.214879	354	29.7	0.200760	584	18.1	22
9	0.221224	089	35.3	0.214525	362	29.5	8.200176	591	17.6	21
10	0.221135		35.2	0.214163		29.2	0.199585		17.0	20
		099			371			597		
11	0.221036	109	35.1	0.213792	379	28.9	0.198988	603	16.5	19
12	0.220927	117	35.0	0.213413	388	28.6	0.198385	609	16.0	18
13	0.220810	127	34.9	0.213025	396	28.3	0.197776	614	15.5	17
14	0.220683	137	34.7	0.212629	405	28.0	0.197162	621	15.0	16
15	0.220546		34.6	0.212224		27.7	0.196541		14.5	15
		145			412			626		
16	0.220401	155	34.4	0.211812	422	27.3	0.195915	632	13.9	14
17	0.220246	165	34.3	0.211390	429	27.0	0.195283	637	13.4	13
18	0.220081	173	34.2	0.210961	438	26.6	0.194646	643	12.8	12
19	0.219908	183	34.1	0.210523	445	26.2	0.194003	647	12.3	11
20	0.219715		33.9	0.210078		25.8	0.193356		11.8	10
		192			454			653		
21	0.210533	201	33.7	0.209624	461	25.4	0.192703	657	11.2	9
22	0.219332	211	33.5	0.209163	470	25.0	0.192046	662	10.6	8
23	0.219121	220	33.3	0.208693	477	24.6	0.191384	666	10.0	7
24	0.218901	228	33.1	0.208216	485	24.2	0.190718	670	9.4	6
25	0.218673		32.9	0.207731		23.8	0.190048		8.8	5
		238			493			675		
26	0.218435	247	32.7	0.207238	500	23.4	0.189373	679	8.2	4
27	0.218188	256	22.5	0.206738	507	23.0	0.188694	683	7.6	3
28	0.217932	265	32.2	0.206231	516	22.6	0.188011	687	7.0	2
29	0.217667	275	32.0	0.205715	522	22.2	0.187324	689	6.4	1
30	0.217392		31.7	0.205193		21.8	0.186635		5.8	0
	Sig. XI.			Sig. X.			Sig. IX.			

TABLE XVI. Logarithms of the Radius Vector of the Orbit of Mars for Jan. 1, 1800, with the Secular Variation.

Argument. The mean Anomaly of Mars.										
Deg.	Sig. III.	Diff.	Sec. Var.	Sig. IV.	Diff.	Sec. Var.	Sig. V.	Diff.	Sec. Var.	Deg.
0	0.186635	694	+ 5.8	0.165331	692	− 15.4	0.147503	446	− 34.8	30
1	0.185941	696	5.2	0.164639	687	16.1	0.147057	433	35.3	29
2	0.185245	699	4.5	0.163952	683	16.8	0.146624	420	35.8	28
3	0.184546	702	3.8	0.163269	678	17.6	0.146204	408	36.3	27
4	0.183844	704	3.3	0.162591	674	18.4	0.145796	394	36.8	26
5	0.183140	707	2.6	0.161917	669	19.1	0.145402	381	37.3	25
6	0.182433	709	1.9	0.161248	663	19.8	0.145021	367	37.8	24
7	0.181724	712	1.2	0.160585	657	20.5	0.144654	353	38.2	23
8	0.181012	713	+ 0.5	0.159928	652	21.2	0.144301	338	38.6	22
9	0.180299	714	− 0.2	0.159276	645	21.9	0.143963	324	39.0	21
10	0.179585	716	0.9	0.158631	639	22.7	0.143639	310	39.3	20
11	0.178869	717	1.6	0.157992	632	23.5	0.143329	295	39.6	19
12	0.178152	717	2.3	0.157360	625	24.2	0.143034	280	39.9	18
13	0.177435	718	3.0	0.156735	618	25.0	0.142754	265	40.2	17
14	0.176717	719	3.7	0.156117	607	25.7	0.142489	250	40.5	16
15	0.175998	720	4.4	0.155510	600	26.3	0.142239	234	40.8	15
16	0.175279	720	5.1	0.154910	593	27.0	0.142005	220	41.1	14
17	0.174559	719	5.8	0.154317	585	27.6	0.141785	204	41.3	13
18	0.173840	718	6.6	0.153732	576	28.3	0.141581	188	41.5	12
19	0.173122	717	7.3	0.153156	565	29.0	0.141393	171	41.7	11
20	0.172405	716	8.0	0.152591	557	29.7	0.141222	155	41.9	10
21	0.171689	715	8.8	0.152034	547	30.3	0.141067	139	42.1	9
22	0.170974	713	9.5	0.151487	537	30.9	0.140928	123	42.3	8
23	0.170261	712	10.3	0.150950	526	31.4	0.140805	108	42.4	7
24	0.169549	709	11.0	0.150424	515	31.9	0.140697	091	42.5	6
25	0.168840	707	11.7	0.149909	504	32.4	0.140606	074	42.6	5
26	0.168133	705	12.4	0.149405	493	32.9	0.140532	058	42.7	4
27	0.167428	702	13.2	0.148912	481	33.4	0.140474	041	42.8	3
28	0.166726	699	14.0	0.148431	470	33.8	0.140433	025	42.8	2
29	0.166027	696	14.7	0.147961	458	34.3	0.140408	009	42.9	1
30	0.165331		15.4	0.147503		34.8	0.140399		42.9	0
	Sig. VIII.			Sig. VII.			Sig. VI.			

TABLE XVII. Equation of the Radius Vector.

Argument II. Long. ♂ — Long. ♃.										
Arg.	0	100	200	300	400	500	600	700	800	900
0	142	185	224	165	55	0	55	165	224	185
10	143	192	223	155	46	0	65	174	224	178
20	144	198	221	144	36	2	76	184	223	172
30	147	204	217	133	28	5	87	193	221	166
40	150	210	213	121	21	9	98	200	218	160
50	155	214	207	109	15	15	109	207	214	155
60	160	218	200	98	9	21	121	213	210	150
70	166	221	193	87	5	28	133	217	204	147
80	172	223	184	76	2	36	144	221	198	144
90	178	224	174	65	0	46	155	223	192	143
100	185	224	165	55	0	55	165	224	185	142

TABLE XVIII.

Argument III. Long. ♂ — 2 Long. ♃.										
Arg.	0	100	200	300	400	500	600	700	800	900
0	9	0	12	41	75	101	110	98	69	35
10	7	0	15	44	78	103	110	95	66	32
20	6	1	17	48	81	104	109	93	62	29
30	4	2	20	51	84	106	108	90	59	26
40	3	3	22	54	87	107	107	88	56	23
50	2	4	25	58	90	108	106	85	52	20
60	1	5	28	61	92	109	105	82	49	18
70	1	7	31	65	95	109	103	79	45	15
80	0	9	34	68	97	110	101	76	42	13
90	0	10	38	71	99	110	100	72	39	11
100	0	12	41	75	101	110	98	69	35	9

TABLE XIX.

Argument IV. 2 Long. ♂ − 3 Long. ♃.										
Arg.	0	100	200	300	400	500	600	700	800	900
0	4	11	17	21	22	18	11	5	1	0
20	5	11	18	21	21	17	11	4	1	1
10	5	12	18	22	21	17	10	4	0	1
30	6	13	19	22	21	16	9	3	0	1
40	7	13	19	22	21	15	9	3	0	1
50	7	14	20	22	20	15	8	2	0	2
60	8	15	20	22	20	14	7	2	0	2
70	9	15	20	22	19	13	7	2	0	3
80	9	16	21	22	19	13	6	1	0	3
90	10	17	21	22	18	12	5	1	0	4
100	11	17	21	22	18	11	5	1	0	4

TABLE XX.

Argument V. Long. ♃.										
Arg.	0	100	200	300	400	500	600	700	800	900
0	2	7	13	17	18	16	11	5	1	0
10	3	8	13	17	18	15	10	5	1	0
20	3	8	14	17	18	15	10	4	1	0
30	4	9	14	17	18	14	9	4	1	0
40	4	9	15	18	17	14	9	3	0	1
50	5	10	15	18	17	13	8	3	0	1
60	5	11	15	18	17	13	7	3	0	1
70	6	11	16	18	17	12	7	2	0	1
80	6	12	16	18	16	12	6	2	0	2
90	7	12	16	18	16	11	6	2	0	2
100	7	13	17	18	16	11	5	1	0	2

Table XXI.

Argument VI. Long. ☉ -- Long. ♂.										
Arg.	0	100	200	300	400	500	600	700	800	900
0	1	0	3	17	31	37	31	17	3	0
10	1	0	4	18	32	37	30	15	2	0
20	1	0	5	20	33	37	29	13	1	0
30	1	0	6	21	34	37	27	12	1	0
40	1	0	8	23	35	36	26	10	1	1
50	1	1	9	25	36	36	25	9	1	1
60	1	1	10	26	36	35	23	8	0	1
70	0	1	12	27	37	34	21	6	0	1
80	0	2	13	29	37	33	20	5	0	1
90	0	2	15	30	37	32	18	4	0	1
100	0	3	17	31	37	31	17	3	0	1

Table XXII.

Argument VII. 2 Long. ♂ — Long. ☉.										
Arg.	0	100	200	300	400	500	600	700	800	900
0	19	13	6	2	0	3	9	16	20	22
10	19	13	6	1	0	3	9	16	21	22
20	18	12	5	1	0	4	10	17	21	22
30	18	11	5	1	1	4	11	17	21	21
40	17	10	4	0	1	5	12	18	22	21
50	17	9	4	0	1	5	13	18	22	21
60	16	9	3	0	1	6	13	19	22	21
70	16	8	3	0	2	6	14	19	22	20
80	15	7	2	0	2	7	15	20	22	20
90	14	7	2	0	2	8	15	20	22	20
100	13	6	2	0	3	9	16	20	22	19

TABLE XXIII.

Argument VIII. 2 Long. ⊖ − 3 Long. ♂.										
Arg.	0	100	200	300	400	500	600	700	800	900
0	4	0	4	13	25	34	38	34	25	13
10	4	0	5	14	26	34	38	33	24	12
20	3	0	5	16	27	35	38	33	23	11
30	3	1	6	17	28	36	37	32	22	10
40	2	1	7	18	29	36	37	31	20	9
50	2	2	8	19	30	36	36	30	19	8
60	2	2	9	20	31	37	36	29	18	7
70	1	2	10	21	32	37	36	28	17	6
80	1	3	11	22	33	38	35	27	16	5
90	0	3	12	24	33	38	35	26	14	5
00	0	4	13	25	34	38	34	25	13	4

TABLE XXIV. The Equation of the Radius Vector in Parts of its Logarithm.

Argument. At the Side, the Log. of the Radius Vector; and at the Top, the Sum of the preceding Equations diminished by 263.									
Arg. Log. of Rad. Vect.	100	200	300	400	500	600	700	800	900
0.220000	26.2	52.3	78	105	131	157	183	209	235
0.215	26.5	53.0	79	106	133	159	185	211	238
0.210	26.8	53.6	80	107	134	161	187	214	241
0.205	27.0	54.1	81	108	135	162	189	216	243
0.200	27.4	54.8	82	109	137	164	192	219	246
0.195	27.7	55.4	83	111	139	166	194	221	249
0.190	28.0	56.1	84	112	140	168	196	224	252
0.185	28.3	56.6	85	113	142	170	198	226	255
0.180	28.7	57.4	86	115	144	172	201	229	258
0.175	29.0	58.0	87	116	145	174	203	232	261
0.170	29.3	58.7	88	117	147	176	205	234	264
0.165	29.7	59.4	89	119	148	178	208	237	267
0.160	30.0	60.0	90	120	150	180	210	240	270
0.155	30.4	60.7	91	121	152	182	213	243	273
0.150	30.7	61.4	92	123	153	184	215	246	276
0.145	31.1	62.2	93	124	155	186	218	249	280
0.140	31.4	62.8	94	126	157	188	220	252	283

Table XXV. Heliocentric Latitude of Mars.

Argument. The Longitude upon the Orbit – the Longitude of the Node.

Degrees.	Sig. O. *N.*	Differ.	Sig. I. *N.*	Differ.	Sig. II. *N.*	Differ.	Degrees.
	Sig. VI. *S.*		Sig. VII. *S.*		Sig. VIII. *S.*		
	D. M. S.	SEC.	D. M. S.	SEC.	D. M. S.	SEC.	
0	0 0 0.0	116.3	0 55 31.3	100.2	1 36 10.5	57.3	30
1	0 1 56.3	116.3	0 57 11.5	99.2	1 37 7.8	55.5	29
2	0 3 52.5	116.2	0 58 50.7	98.1	1 38 3.3	53.7	28
3	0 5 48.7	116.0	1 0 28.8	97.0	1 38 5 0	51.9	27
4	0 7 44.7	115.9	1 2 5.8	95.8	1 39 48.9	50.1	26
5	0 9 40.6	115.8	1 3 41.6	94.7	1 40 39.0	48.2	25
6	0 11 36.4	115.6	1 5 16.3	93.5	1 41 27.2	46.4	24
7	0 13 32.0	115.3	1 6 49.8	92.2	1 42 13.6	44.6	23
8	0 15 27.3	114.9	1 8 22.0	91.0	1 42 58.2	42.7	22
9	0 17 22.2	114.7	1 9 53.0	89.7	1 43 40.9	40.7	21
10	0 19 16.9	114.3	1 11 22.7	88.5	1 44 21.6	38.8	20
11	0 21 11.2	114.0	1 12 51.2	87.1	1 45 0.4	36.9	19
12	0 23 5.2	113.5	1 14 18.3	85.8	1 45 37.3	35.0	18
13	0 24 58.7	113.1	1 15 44.1	84.4	1 46 12.3	33.0	17
14	0 26 51.8	112.6	1 17 8.5	82.9	1 46 45.3	31.1	16
15	0 28 44.4	112.0	1 18 31.4	81.5	1 47 16.4	29.1	15
16	0 30 36.4	111.5	1 19 52.9	80.1	1 47 45.5	27.1	14
17	0 32 27.9	110.9	1 21 13.0	78.6	1 48 12.6	25.2	13
18	0 34 18.8	110.3	1 22 31.6	77.0	1 48 37.8	23.2	12
19	0 36 9.1	109.6	1 23 48.6	75.5	1 49 1.0	21.2	11
20	0 37 58.7	108.9	1 25 4.1	74.0	1 49 22.2	19.2	10
21	0 39 47.6	108.2	1 26 18.1	72.5	1 49 41.4	17.2	9
22	0 41 35.8	107.4	1 27 30.6	70.9	1 49 58.6	15.2	8
23	0 43 23.2	106.7	1 28 41.5	69.1	1 50 13.8	13.2	7
24	0 45 9.9	105.8	1 29 50.6	67.6	1 50 27.0	11.2	6
25	0 46 55.7	104.9	1 30 58.2	65.9	1 50 38.2	9.1	5
26	0 48 40.6	104.1	1 32 4.1	64.1	1 50 47.3	7.1	4
27	0 50 24.7	103.2	1 33 8.2	62.5	1 50 54.4	5.1	3
28	0 52 7.9	102.2	1 34 10.7	60.8	1 50 59.5	3.0	2
29	0 53 50.1	101.2	1 35 11.5	59.0	1 51 2.5	1.0	1
30	0 55 31.3		1 36 10.5		1 51 3.5		0
	Sig. XI. *S.*		Sig. X. *S.*		Sig. IX. *S.*		
	Sig. V. *N.*		Sig. IV. *N.*		Sig. III. *N.*		

TABLE XXVI. Reduction to the Ecliptic both in Longitude and for the Radius Vector.

The Longitude upon the Orbit — the Longitude of the Node.

Degrees.	Sig. O. — / Sig. VI. —	Diff.	Log.	Sig. I. — / Sig. VII. —	Diff.	Log.	Sig. II. — / Sig. VIII. —	D ff.	Log.	Degrees.
	SEC.	SEC.	—	SEC.	SEC.	—	SEC.	SEC.	—	
0	0.0	1.9	0.0	46.6	0.9	56.7	46.6	1.0	169.9	30
1	1.9	1.9	0.1	47.5	0.8	60.0	45.6	1.0	173.4	29
2	3.8	1.9	0.3	48.3	0.8	63.6	44.6	1.1	176.3	28
3	5.7	2.0	0.6	49.1	0.7	67.3	43.5	1.1	179.9	27
4	7.7	1.8	1.1	49.8	0.7	70.8	42.4	1.2	183.1	26
5	9.5	1.7	1.7	50.5	0.7	74.6	41.2	1.2	186.1	25
6	11.2	1.8	2.5	51.1	0.6	78.2	40.0	1.3	189.1	24
7	13.0	1.8	3.3	51.7	0.5	82.1	38.7	1.3	191.6	23
8	14.8	1.8	4.4	52.2	0.4	85.9	37.4	1.4	194.8	22
9	16.6	1.8	5.5	52.6	0.3	89.7	36.0	1.4	197.5	21
10	18.4	1.8	6.8	52.9	0.3	93.6	34.6	1.5	199.9	20
11	20.2	1.7	8.2	53.2	0.3	97.5	33.1	1.5	202.6	19
12	21.9	1.7	9.8	53.5	0.2	101.4	31.6	1.5	205.0	18
13	23.6	1.7	11.5	53.7	0.1	105.4	30.1	1.6	207.2	17
14	25.3	1.6	13.2	53.8	0.0	109.3	28.5	.6	209.4	16
15	26.9	1.6	15.2	53.8	0.0	113.3	26.9	1.6	211.5	15
16	28.5	1.6	17.2	53.8	0.1	117.2	25.3	1.7	213.4	14
17	30.1	1.5	19.3	53.7	0.2	121.2	23.6	1.7	215.1	13
18	31.6	1.5	21.7	53.5	0.3	125.2	21.9	1.7	216.8	12
19	33.1	1.5	24.0	53.2	0.3	129.1	20.2	1.8	218.2	11
20	34.6	1.4	26.5	52.9	0.3	133.0	18.4	1.8	219.6	10
21	36.0	1.4	29.1	52.6	0.4	136.9	16.6	1.8	221.1	9
22	37.4	1.3	31.8	52.2	0.5	140.7	14.8	1.8	222.3	8
23	38.7	1.3	34.6	51.7	0.6	144.6	13.0	1.8	223.2	7
24	40.0	1.2	37.5	51.1	0.6	148.3	11.2	1.7	224.2	6
25	41.2	1.2	40.5	50.5	0.7	152.1	9.5	1.8	225.0	5
26	42.4	1.1	43.5	49.8	0.7	155.7	7.7	2.0	225.5	4
27	43.5	1.1	46.7	49.1	0.8	159.4	5.7	1.9	226.0	3
28	44.6	1.0	49.9	48.3	0.8	163.0	3.8	1.9	226.4	2
29	45.6	1.0	53.3	47.5	0.9	166.5	1.9	1.9	226.6	1
30	46.6		56.7	46.6		169.9	0.0		226.6	0
	Sig. XI. + / Sig. V. +		—	Sig. X. + / Sig. IV. +		—	Sig. IX. + / Sig. III. +		—	

Mars, among *Alchemists*, signifies iron; because imagined to be under the influence of that planet. See Iron.

Mars *Saccharatus*. See Iron.

Mars *Sulphuratus*. See Iron.

Crocus Martis, rust of iron. See Crocus *martis*, and Iron.

Mars, *Crystals of*. See *Sulphat of* Iron.

Mars, called *Ares* by the Greeks, in *Mythology*, the god of war, the son of Jupiter and Juno, according to Homer and the other Greek poets, or, as Ovid tells the story, of Juno alone; she being displeased that Jupiter should have a daughter Minerva, without female aid: being therefore a son of discontent, he was made the god of war and strife. He had a sister called Bellona, the goddess of war.

Among the ancients, there were several princes of this name. The first, to whom Diodorus attributes the invention of arms, and the art of marshalling troops in battle, was the Belus, whom the scripture calls Nimrod, the mighty hunter (Gen. v.), who, after having practised his skill upon wild beasts, turned it against men; and having subdued a great number of them, declared himself their king. The second Mars was an ancient king of Egypt. The third was king of Thrace, called Odin, distinguished by his valour and conquests, and promoted to the honour of god of war, and called the Hyperborean Mars. The fourth is called the Mars of Greece, surnamed Ares. The fifth, and last, is the Mars of the Latins, who entered into the prison of Rhea Sylvia, and begat upon her Romulus and Remus. In fine, the name of Mars was given to most warlike princes, and every country valued itself on having one, as well as a Hercules. Accordingly we find one among the Gauls under the name of Hesus; and, it is said by Lucian and Lactantius, that these ancient people sacrificed to him human victims. We find a Mars also among the Scythians. The Greeks threw into the history of their Mars the adventures of all that have been now named. Arnobius represents the Mars of Greece as merely a deified man.

Although Mars was worshipped in several places, yet he was no where in such high veneration as at Rome, where he had several temples; among which, that dedicated to him by Augustus after the battle of Philippi, under the name of Mars the Avenger, was one of the most celebrated.

He had for his priests the *salii* and *flamines*, who from him were called *Martiales*. They sacrificed asses to him, on account of the harsh dissonance of their voice. The vulture was a bird sacred to him, from their always flying to those places where armies are going to engage, and bloodshed is to be expected. The usual attributes of Mars are the helmet and spear, which he does not lay aside, even when he is going on his amours. Several of the old Roman poets of the first age speak of a wife of Mars, called Neriene, signifying, according to some, *mildness*, and given to him in order to soften and humanize the roughness of his temper; but we find no traces of her in their later poets. The temples of Mars were of the Doric order, and usually placed without the walls; hereby denoting that this deity was to preserve the walls from the perils of war.

Mars, *Games of*, *ludi Martiales*, were combats instituted at Rome in honour of the god Mars.

They were held twice in the year; once in the Circus, on the fourth of the ides of May; and a second time on the first of August. These latter were established some time after the other, in memory of the dedication of the temple of Mars on that day. These games consisted in courses of horses, and combats with wild beasts. Germanicus is said to have killed two hundred lions in the Circus, on these occasions. See Field *of Mars*.

Mars *Diep*, in *Geography*, a road for shipping, at the entrance of the Zuyder see from the German ocean, between the coast of Holland and the Texel.

Mars *la Tour*, a town of France, in the department of the Moselle; 11 miles W.S.W. of Metz.

MARSA, in *Ancient Geography*, a town of Pannonia, near which the emperor Constantius gave battle to Magnentius, who had assumed the title of emperor of the Gauls.

Marsa, in *Geography*, a town of Africa, in the kingdom of Tunis; 10 miles N.E. of Tunis.

MARSAC, a town of France, in the department of the Puy de Dome; 30 miles N. of Le Puy.

MARSAGLIA, a town of France, in the department of the Stura; six miles N.E. of Mendovi.

MARSAL, a town of France, in the department of the Meurte; 17 miles E.N.E. of Nancy. N. lat. 48° 48'. E. long. 6° 41'.

MARSALA, a sea-port town on the W. coast of the island of Sicily, erected on the scite of the ancient *Lilybæum*, which see.—Also, the name of a river, which runs into the sea, about a mile S. from the town of Marsala.

MARSAN, a small country of France, before the revolution, of which Monte de Marsan was the capital: now a part of the department of the Landes.

MARSANA Buxifolia, in *Botany*, Sonnerat Voy. aux Ind. Orient. v. 2. 245. t. 139, so named by that author as a compliment to the *Princesse de Marsan*, governess of the royal children of France, is no other than *Murraya exotica* of Linnæus. See Murraya.

MARSANNE, in *Geography*, a town of France, in the department of the Drome, and chief place of a canton, in the district of Montelimart; eight miles N.N.E. of Montelimart. The place contains 1075, and the canton 6177 inhabitants, on a territory of 212½ kiliometres, in 14 communes.

MARSAQUIVER, or Marsalquiver, a sea-port of Algiers, on the coast of the Mediterranean, belonging to the Spaniards, who took it in the year 1732; three miles from Oran.

MARSCH, or Mark, a river which rises in the S. part of the county of Glatz, soon after enters Moravia, passes by Littau, Olmutz, Hradisch, &c. and runs into the Danube, at the boundaries of Austria and Hungary, six miles above Presburg, and 32 below Vienna.

MARSCIANO, a town of Italy, in the Perugiano; 22 miles S.S.W. of Perugia.

MARSDENIA, in *Botany*, received its name from the pen of Mr. R. Brown, in honour of William Marsden, esq. F.R.S. late secretary to the Admiralty, the learned author of the History of Sumatra; who, if not a practical botanist, has illustrated so many subjects connected with the science, and is on all occasions so liberal in his communications, that no one, who knows him or his works, can think the compliment misapplied.—Brown in Mem. of the Wernerian Society, v. 1. 28. Prod. Nov. Holl. v. 1. 460. Ait. Hort. Kew. ed. 2. v. 2. 84.—Class and order, *Pentandria Digynia*. Nat. Ord. *Contortæ*, Linn. *Apocyneæ*, Juss. *Asclepiadeæ*, Brown.

Gen. Ch. *Cal.* Perianth inferior, of one leaf, in five acute equal segments, rather small, permanent. *Cor.* of one petal, pitcher-shaped, or nearly wheel-shaped, in five bluntish segments. Crown of the stamens of five compressed, simple, undivided leaves, without any internal teeth. *Stam.* Filaments five, broad, flat, cloven at the top; anthers sessile on the inside of the filament, of two separate cells, terminated by a common membrane; masses of pollen projected from the

the anthers upon the ſtigma in pairs, erect, ſticking by their baſe. *Piſt.* Germens two, ſuperior, ovate; ſtyles combined, very ſhort; ſtigma ſingle, generally ſimple, ſometimes beaked, the beak either ſimple or divided. *Peric.* Follicles two, ovate-oblong, ſmooth. *Seeds* numerous, imbricated, comoſe.

Eſſ. Ch. Corolla nearly wheel-ſhaped, five-cleft. Crown of the ſtamens of five compreſſed undivided leaves, without teeth. Anthers terminated by a membrane; maſſes of pollen ten, ſmooth, erect. Follicles ſmooth. Seeds comoſe.

The ſtem in this genus is rather ſhrubby, generally twining, round, ſcarcely angular. Leaves oppoſite, ſtalked, broadiſh, flat. Cymes or tufts lateral, between the footſtalks. It is very nearly related to *Pergularia*; from which, according to Mr. Brown himſelf, it differs merely in the want of a tooth, or appendage, at the inſide of each leaf of the crown. There appears however to be more of a tube in *Pergularia*, the corolla of which is truly ſalver-ſhaped.

Eight ſpecies are deſcribed by the author of the genus.

1. M. *velutina.* Soft-leaved Marſdenia.—Stem twining. Leaves heart-ſhaped, broadly ovate, pointed, downy and ſoft. Cymes umbel-ſhaped. Mouth of the flower naked.—Gathered by Mr. Brown in the tropical part of New Holland.

2. M. *tinctoria.* Indigo Marſdenia (Tarram akkar; Marſd. Sumatr. 78.)—Stem twining. Leaves heart-ſhaped, ovate-oblong, pointed, nearly ſmooth, glandular in their forepart. Tufts lateral. Mouth of the flower bearded.—Native of Sumatra. Seen by Mr. Brown in the Bankſian herbarium. This plant is ſaid to afford the beſt indigo in Sumatra, and as Mr. Marſden appears to be the firſt perſon who has given any account of it, there is the more propriety in its bearing his name. For the indigo in general uſe, ſee Indigo and Indigofera.

3. M. *viridiflora.* Green-flowered Marſdenia.—Stem twining. Leaves oblong-lanceolate, ſmoothiſh, obtuſe at the baſe. Tube of the flower ſlightly hairy within.—Gathered by Mr. Brown in New Holland, within the tropic.

4. M. *clauſa.* Hairy-mouthed Marſdenia. Stem twining. Leaves lanceolate, acute at each end, ſmooth; ſlightly rugoſe on the upper ſide. Mouth of the flower denſely bearded.—Gathered in Jamaica, by profeſſor Swartz, who gave it to ſir Joſeph Banks, but does not appear to have mentioned it in any of his works.

5. M. *ſuaveolens.* Sweet-ſcented Marſdenia.—Stem nearly erect. Leaves oval-lanceolate, ſmooth, veinleſs. Tube of the flower ſwelling; mouth bearded.—Native of New South Wales, about Port Jackſon, where it was gathered by Mr. Brown, as well as by Dr. White. The character of the tube in this ſpecies ſeems, in that reſpect, to invalidate the above-mentioned diſtinction between *Marſdenia* and *Pergularia*.

6. M. *cineraſcens.* Aſh-coloured Marſdenia.—Stem erect. Leaves ovate, bluntiſh, veiny, ſlightly downy. Footſtalks half an inch long. Corolla nearly wheel-ſhaped.—Found by Mr. Brown in the tropical part of New Holland.

All the above have a ſimple pointleſs ſtigma, and are conſidered by the author juſt mentioned as the moſt true and genuine *Marſdeniæ.* The two following have a beaked ſtigma.

7. M. *erecta.* Upright Marſdenia. Hort. Kew. as above. (Cynanchum erectum; Linn. Sp. Pl. 311. Willd. Sp. Pl. v. 1. 1258. Jacq. Hort. Vind. v. 1. 14. t. 38. Apocynum primum latifolium; Cluſ. Hiſt. v. 1. 124. Periploca latifolia; Ger. Em. 902.)—Stem erect. Leaves heart-ſhaped, ovate, acute. Cymes umbel-like. Segments of the limb beardleſs, four times as long as the tube.—Native of Syria. Gerarde had it in his garden, having received it, as he informs us, from "his loving friend John Robin, herbariſt in Paris." (See Robinia.) It is marked by Mr. Aiton as a ſtove plant. Jacquin ſays it requires the ſhelter of a greenhouſe at Vienna in winter, but flowers in the open air in June and July, though without bearing fruit. This is a ſmooth, upright, but weak, *ſhrub*, irregularly branched, five or ſix feet high, with pliant leafy twigs, ſomewhat diſpoſed to twine round their neighbours. When wounded they are, according to Jacquin, not milky. *Leaves* imperfectly oppoſite, heart-ſhaped, acute, entire, glaucous, milky, an inch and half long, and an inch wide, on round *footſtalks* half an inch in length. *Cymes* lateral, of numerous, white, fragrant *flowers*, ſmaller than hawthorn bloſſoms.

8. M. *roſtrata.* Beaked Twining Marſdenia.—Stem twining. Leaves ovate, ſomewhat heart-ſhaped, pointed, ſmooth. Umbels many-flowered. Limb bearded.—Gathered by Mr. Brown in New South Wales. This ſpecies is ſaid in his *Prodromus* to differ from its congeners, in having the maſſes of pollen kidney-ſhaped, and ſomewhat tranſverſe, ſticking upon the extremity of the ſtigma, at ſome diſtance from its glandular part. Hence the name *Nephrandra*, (from νεφρος, *the kidney*, and ανηρ, *a man*,) alluding to the form of the impregnating ſubſtance, is ſuggeſted in that work, apparently under ſome idea of the plant's poſſibly conſtituting a genus by itſelf.

MARSEILLE, in *Geography*, a town of France, in the department of the Oiſe, and chief place of a canton, in the diſtrict of Beauvais; 11 miles N.W. of Beauvais. The place contains 700, and the canton 10,838 inhabitants, on a territory of 155 kiliometres, in 18 communes.

Marseilles, a city of France, and principal place of a diſtrict, in the department of the Mouths of the Rhone, near the coaſt of the Mediterranean. For an account of its foundation and ancient ſtate; ſee Massilia. This ancient city was for a long time an independent commercial republic, till at length, in the progreſs of the Roman conqueſts in Gaul, it was ſubdued by their arms; and under their government, it flouriſhed in commerce, arts, and elegant literature. However, its opulence and glory periſhed in the common ruin of the Roman empire. The advantages of its ſituation at the foot of a rocky mountain, near the ſea, cauſed its trade to revive, even in the ages of Gothic barbariſm; nevertheleſs it languiſhed under the government of the counts of Provence. Since its union with the other dominions of the kings of France, Marſeilles has enjoyed a diſtinct municipal government and juriſdiction, under magiſtrates elected by the citizens. The ſubſidies which it formerly paid for the ſupport of the French government were impoſed by the king's edicts, and amounted to nearly one-third of the whole revenue paid by Provence. Marſeilles is divided into the Old and New Town; the former lies on an eminence, conſiſts of narrow crooked ſtreets with mean houſes, and is inhabited chiefly by fiſhermen and other poor people; the public ſtreets are ſpacious and extenſive, and the houſes regularly built, elegant and commodious, which are occupied by opulent families, and by thriving merchants, tradeſmen, and manufacturers. The port exhibits a noble ſpectacle of commercial induſtry, and the quay, in its proſperous ſtate, was crowded with a buſy multitude, conſiſting of people of all nations and languages; the neighbouring territory is thickſet with villas belonging to the wealthy inhabitants of the city; its trade extended to various parts of the globe, and its manufactures were various and extenſive.

Before the revolution, this city was the reſidence of a bailiwic, and the ſee of a biſhop; it had alſo four pariſh

churches,

churches, including the cathedral, and two collegiate ones, with two abbies, an academy of the fine arts, an obſervatory, and a mintage. Its arſenal was ſtored with all implements neceſſary for fitting out the gallies; its armoury, conſiſting of four walks interſecting one another, was reckoned the fineſt in the kingdom, and contained arms for 40,000 men. In the arſenal is a dock for building the gallies, which, being roofed over, and communicating with the harbour, is of a parallellogrammic form, having public and private buildings on the two long ſides, and on one of the ſhorter, the other ſide affording an opening into the Mediterranean, and being defended on each point by a ſtrong fort. The entrance into the harbour is rendered difficult by a rocky cape that is contiguous, nor has it depth of water ſufficient for men of war. This port was frequented, before the revolution, by upwards of 4500 veſſels in the courſe of a year. The number of inhabitants in the city, is reckoned at 111,130, and in the canton 115,394, on a territory of 310 kiliometres, in two communes. N. lat. 43° 17′ 43″. E. long. 5° 22′ 12″.

MARSH, in *Agriculture*, a term applied to a tract of land lying on the borders of the ſea, or any large river into which it flows. Theſe tracts of land are moſtly level, and converted to the purpoſes of grazing either with ſheep or other animals. And in ſome diſtricts, lands of this nature are ſubdivided or diſtinguiſhed into two kinds, *ſalt marſhes* and *freſh marſhes*. The former are ſometimes ſimply termed *ſalts* or *ſaltings*. They are the parts or portions of marſh grounds, which lie without the walls or embankments where ſuch defences exiſt.

Marſhes are for the moſt part of a rich deep alluvial nature in the qualities of their ſoils.

It is ſtated by the author of the Synopſis of Huſbandry, in ſpeaking of the marſhes in the ſouthern parts of the iſland, that they are ſubject to be overflown at every ſpring tide, or at other times, when, by the violence of the wind, or the impetuoſity of the tide, the water flows beyond its uſual limits. "The goodneſs of the ſalts is in a great meaſure analogous to the fertility of the adjoining marſhes; and the extent of them differs according to the ſituation, as in ſome places the tide beats directly againſt the wall, whilſt in others the ſalts or forelands are of a conſiderable breadth." It is likewiſe added, that "in ſome places the graſs from ſalts is annually mown, and yields a ſhort, delicate hay, that proves a very ſalubrious provender for ſheep; but care muſt be taken to prevent its being carried off by the tide, for which reaſon it is often found neceſſary to bring it into the incloſures for making." It is added, that "theſe ſalt marſhes are very efficacious in relieving many complaints incident to cattle, and are likewiſe uſeful in furniſhing a conſiderable range for young ſheep. In feeding them, however, ſome caution is to be uſed, and it will be neceſſary to remove the ſtock over the wall on the apprehenſion of a high tide, but more eſpecially on the approach of ſpring tides, when the ſalts are uſually overflowed. As the return of theſe latter is periodical, and a high tide may generally be before ſeen by thoſe who are converſant in theſe matters, it rarely happens that any miſchief enſues when there is no breach made in the wall; though there have been inſtances where ſheep have been drowned on the ſalts, from a ſudden and unexpected high tide, and others, where this misfortune has been the conſequence of neglect, in not bringing the ſtock over the wall; or, as it is termed by the graziers, locking them on ſuch occaſions."

But the latter are thoſe tracts of land that lie within the wall, and are very extenſive in many parts of the kingdom. It is obſerved in the work juſt mentioned, that "Romney marſh is by far the moſt extenſive, and withal the moſt fertile of any level which comes under this denomination. It contains near 24,000 acres; beſides which are Walland marſh and Dinge marſh, which are compriſed within the walls, the former 12,000, and the latter 8000 acres." And it is ſtated, that "the internal regulations of theſe marſhes are committed to the ſuperintendance of expenditors. Theſe are appointed by the Commiſſioners of Sewers, and are to take care that the repairs of the walls are maintained in due order, and that the coſts attending the ſame be levied on each tenant, according to the number of acres occupied by him; for which purpoſe they are to cauſe aſſeſſments to be made out, with the names of the occupiers, and the rateable proportions to be borne by them reſpectively; and theſe rates, which muſt be confirmed by the commiſſioners, are termed ſcots; and that when any occupier refuſes to pay his ſcot, the expenditors can obtain a warrant from the commiſſioners empowering him to diſtrain for the ſame, as for any other tax." Theſe marſhes are both appropriated to the purpoſes of breeding and feeding. Beſides theſe marſhes, there are vaſt tracts of them in various other parts of the kingdom. See Grazing.

It is further ſuggeſted by the writer juſt noticed, that "the naked and expoſed ſituations of marſhes render them exceſſively cold in the winter, and no leſs ſubject them to the inconvenience of the parching heat of the ſun in the ſummer months. To guard againſt theſe two extremes, it might, perhaps, be no unprofitable undertaking to form plantations of trees in different parts, which would operate as well for a ſhade againſt the ſun's rays, as a defence to break off the winter blaſts. Many trees might be fixed on for this purpoſe, which, delighting in a moiſt ſituation, ſeem in a very peculiar manner adapted to this uſe. Of this kind are the alder, the ſycamore, the willow, and the poplar. Clumps of one or other of theſe trees being planted in different parts, would, it is ſuppoſed, be found very beneficial, and completely anſwer the purpoſes before mentioned. To every one who hath been converſant in huſbandry, it is evident with what avidity cattle of every kind fly to the ſhade in the ſummer ſeaſon; at which time they will even neglect their food to avoid the ſcorching heat of the ſun, and the more intolerable ſtings of the inſect tribe; ſo that in the middle of a ſummer's day, it is in vain to ſearch for a flock of ſheep in the uplands. At that time the hedges afford them a ſecure aſylum; but in marſhes, where this protection is wanting, it ſurely would be worth the trial to ſet about raiſing a ſhelter, which may anſwer in ſome reſpects the purpoſes of hedges in incloſures. Beſides, as theſe aquatics are all of them quick in forming their ſhoots, a few years, in a ſoil propitious to their growth, will furniſh a conſtant ſupply of poles adapted to cutting into rails, for which there is always a perpetual demand, and which will be no inconſiderable ſaving, not only in the original purchaſe of theſe articles, but in the carriage or conveyance of them likewiſe."

And it is aſſerted that "great profit is made by the renters of marſhes in the neighbourhood of London bordering on the Thames, from joiſting of horſes, the paſture being deſervedly accounted ſalubrious to that uſeful animal; for which reaſon, ſuch horſes as have been worn down by hard travel, or long afflicted with the farcy, lameneſs, &c. have frequently been reſtored to their priſtine health and vigour, by a few months run in the marſhes, eſpecially on the ſaltings; but as every piece of marſh land in ſome meaſure participates of this ſaline diſpoſition, ſo do they all of them poſſeſs, in a comparative degree, the virtues above-mentioned; and for this reaſon the Londoners are happy to procure a run for their horses, at four or five shillings *per* week." And "another method practised by the graziers in the vicinity of London is, to purchase sheep or bullocks in Smithfield at a hanging market, which being turned into the marshes, in the lapse of a few weeks, are not only much improved in flesh, but go off at a time when the markets, being less crowded, have considerably advanced in price; and thus a two-fold gain is made from this traffic: and as many of the wealthy butchers of the metropolis are possessed of a tract of this marsh land, they have, from their constant attendance at Smithfield, a perfect knowledge of the rise and fall in the markets, and consequently are enabled to judge with certainty, when will be the proper time to buy in their stock, and at what period to dispose of them." These advantageous modes of traffic are confined solely to those graziers who reside in the vicinity of London. "In the Isle of Sheppey, where they proceed on different principles, the graziers never wish to depasture any horses; this animal being thought by them to do much injury to the marshes, especially in wet seasons, by trampling with his feet, and is moreover very apt to wade through the ditches, and to break down the dry fences. These are arguments sufficiently cogent to induce those graziers to reject the joisting of horses; whilst those who reside in the vicinity of the metropolis, where the weekly pay is larger, and they depend greatly on this method, are justified in adhering to a custom which they find turns out so considerably to their profit and advantage."

In many districts of the island that are situated on the borders of the sea, or near the mouths of large rivers, there are very extensive tracts of this description of land, which by proper drainage and inclosure may be rendered highly valuable and productive. This is particularly the case in Somersetshire and Lincolnshire, as well as that mentioned above, and others more to the north of the kingdom. In the former of these counties, vast improvements have, according to Mr. Billingsley, as stated in his Survey, been effected by the cutting rhynes and ditches, for the purpose of dividing the property, and the deepening of the general outlets, to discharge the superfluous water. Many thousand acres which were formerly overflown for months together, and consequently of little or no value, are now become fine grazing and dairy lands.

The quantity that has been thus improved under the authority of parliament on Brent marsh, within these twenty years, is thus stated:

Names.			Acres.	
Westmore and Meare			4400	with 1000 acres of turf-bog not yet improved.
Compton Bishop		-	300	
Glastonbury		-	1500	ditto 300 ditto.
Westhay, &c.		-	1700	ditto 1000 ditto.
Mark	-	-	2000	
Buntspil	-	-	1200	
Shapwick	-	-	100	
Blackford	-	-	900	
Wookey	-	-	900	
Westbury	-	-	450	
Bleadon	-	-	400	
West Pennard		-	250	
Eddington	-	-	1000	ditto 400 ditto.
Stoke and Draycot			800	
Nyland	-	-	350	
Wells	-	-	1150	
			17,400	

And that of these 17,400 acres, six parts of seven are cleared of stagnant water, and rendered highly productive; while the turf-bogs have been little improved. It is likewise added, that in the parish of Mark alone, 10,000 sheep have been rotted in one year, before the inclosing and draining were attempted.

And the same writer states, that the probable expence and subsequent improvement of the complete drainage of the above-named marsh and the river Axe, would stand thus:

Brent Marsh.

Dr.

To act of parliament gaining consent, &c.		£ 400
——— Sluice near the river Perrot	-	6
——— Twelve miles of new drain, average depth fifteen feet	- -	12,000
——— Lowering river Brue three miles	-	1500
——— Purchase of land - -	-	2000
——— Bridges, hatches, &c. -	-	2000
——— Sluice on Axe, near Hobbs Boat	-	500
——— One mile and a half new drain	-	1500
——— Lowering river Axe six miles	-	1000
——— Purchase of land -	-	1000
——— Commissioners, surveyors, &c.	-	2500
		24,406
To balance of profit	-	331,844
		356,250

Cr.

By 9000 acres of turf-bog improved at the most moderate computation 15*s. per* acre, making 6750*l. per annum*, twenty-five years purchase - - - -	168,750
By 15,000 acres of marsh flooded land 10*s. per* acre, or 7500*l. per annum*, twenty-five years purchase - - -	187,500
	356,250

The view and statements which are here given fully shew the vast benefits that may be derived to individuals as well as the nation at large, by improving lands of the marsh kind by judicious draining, embanking, and other means. Yet, notwithstanding this, immense tracts of ground of this sort remain without improvement, and of course of very little value.

Marsh *Land*, a sort of rich pasture or grazing ground lying near the sea, or large rivers. In some places it is termed fen, but very improperly. See Fen.

Where marsh land lies flat, it is necessary for the owner to keep all the water he can from it. The sea-water in particular is to be kept from it as much as possible; and this is usually done at a very great expence, by high banks and walls. There are two things greatly wanting in these lands, in general, which are good shelter for the cattle, and fresh water. The careful farmer may, however, in a great measure obviate these by digging, in proper places, large ponds to receive the water, and by planting trees and hedges in certain places towards the sea, where they may not only afford shelter for the cattle, but keep off the sea breezes, which will often cut off the tops of all the grass in these places, and make it look as if mown with a scythe.

Experience hath shewn, that these sorts of lands fatten cattle the soonest of any, and that they preserve sheep from the rot. It would be of great advantage to them, if there were

were raifed, in the middle of every large marfh, banks of earth in a crofs, or in the form of two femicircles, and thefe planted with trees; thefe would ferve as a fhelter for cattle, let the wind blow from what quarter it would, and would foon repay the expence of making the improvement.

In different parts of the kingdom there are very large quantities of land upon the fea-coafts that would be worth taking in, though little has yet been done in that way. The coafts about Bofton, Spalding, and many other parts of Lincolnfhire, give frequent inftances of this, where the fea falls from the land, fo that on the outfide of the fea walls, on the owfe, where every tide the falt water comes, there grows a great deal of good grafs, and the owfe is firm to ride upon when the water is upon it. This owfe, when taken, hardly finks any thing at all, and they dig the walls from the outfide of it, all the earth they are made of being taken thence, the fea, in a few tides, filling it up again: and though the fea, at high water, comes only to the foot of the bank, yet once in a year or two, fome extraordinary tide goes over the banks, though they are ten feet high. Thefe banks are fifty feet broad at the bottom, and three feet at the top; the earth being all carried in wheelbarrows, and the face towards the fea, where the greateft flope is turfed.

In fpeaking of the Romney marfh lands, Mr. Bannifter ftates, that "the natural fituation of marfh land, fo much beneath the furface of the uplands, renders it fubject to be frequently covered with water in the winter time; and as this circumftance proves highly detrimental to the land, by protracting the growth of the grafs, and in caufing it to be four and ill tafted, no pains fhould be fpared to refift the calamity, as well by keeping the ditches fufficiently cleanfed, as by cutting drains in different parts of the marfh to carry off the fuperfluous water."

And alfo, "as the gate-ways in the marfhes are apt to be very miry in the winter feafon, care fhould be taken to heighten the ground with ftones, gravel, or chalk, which will render thefe paffages much more comfortable to the drivers, no lefs than to the ftock, efpecially milch cows, which being brought twice a day into the yard, would, but for this precaution, caufe the gate-ways to be impervious in wet weather."

Befides, "when the fummer turns out moift and growing, the herbage often fhoots fafter than the ftock can eat it down. In this cafe it is common to brufh over the marfhes at the mowing feafon, though they had not originally laid in for that purpofe; by which economy the farmer becomes poffeffed of a much larger portion of hay than he had before formed an expectation of, and which, in counties where this commodity fetches a good price, is an advantage whereof he has a right to avail himfelf; for thefe cafual brufhings may probably furnifh him with a quantity of winter provender, fufficient to his own ufe; whilft thofe marfhes which were primarily intended to be mown, and have been defignedly laid in with that view, will produce a commodity of a better quality and more faleable, that may be difpofed of at market. Thofe graziers, on the contrary, who live at a diftance from the market, and are on account of their local fituation obliged to pay larger wages to their workmen, flight the opportunity of increafing their ftock of hay; and in cafes where the humidity of the fummer hath rendered it neceffary to mow the bullock paftures, in order that the fucceeding fhoot of grafs may be more fweet and toothfome, have made a free gift of the fame to thofe who have engaged to clear it off the ground." On the removal of this old grafs, the ground is left at liberty to fend forth a more vigorous fhoot in the autumn, fo that thefe rouens at that time produce a fweet and wholefome pafturage, which would otherwife have been choaked up with the rotten tore of the laft year: yet there are cafes where it may be neceffary to fuffer this old grafs to remain on the ground, as where a portion of food is required for the cows or other horned beafts in the winter. Then this old tore, having been fweetened by the frofts, will be found exceedingly ufeful, and the cattle will at that time greedily devour, what in the fummer months they turned from with difguft and indifference.

This fort of management is only required in particular cafes; in others the grafs never becomes coarfe and rank, but, on the contrary, remains clofe and fine in the marfhy paftures.

Marsh *Mallow*, in *Botany*. See Althæa.

Marsh *Trefoil*. See Menyanthes.

Marsh, Nicholas, in *Biography*, an eminent Irifh prelate, was born at Hannington, in Wiltfhire, in the year 1638. He finifhed his education at Magdalen college, Oxford, where he took the degree of B. A. in 1657. In the following year he was elected fellow of Exeter college, and proceeded as a member of that college M. A. in 1760, D. D. in 1671. During thefe periods he was made chaplain to Dr. Ward, bifhop of Exeter, and afterwards to the earl of Clarendon, lord chancellor. He obtained fome other preferment, and in 1678 he was nominated to the vacant provoftfhip of Dublin college, where he difcharged the duties of his high truft with fuch fidelity and regularity, that his conduct has been held up as a pattern to all his fucceffors. In 1682-3, he was promoted to the fees of Leighlin and Ferns, and in 1690 he was tranflated to the archbifhopric of Cafhel, from thence to Dublin, and from Dublin to Armagh. While he filled the fee of Dublin, he built a noble library, which he enlarged after he became primate, and furnifhed with a choice collection of books. He endowed an hofpital at Drogheda for the reception of twelve widows of decayed clergymen, to each of whom he affigned an apartment, and twenty pounds a year for maintenance. He extended his bounty to the encouragement of the propagation of the Gofpel, and to other munificent and charitable inftitutions; prefenting a number of oriental MSS. to the Bodleian library at Oxford. After having lived many years in great honour and reputation, and been feven times appointed one of the lords-juftices of Ireland, he died, in the 75th year of his age, in 1713. He was a man of extenfive and deep learning; and in his perfonal character he was pious, amiable, and exemplary. As an author, his principal piece was "An introductory Effay to the Doctrine of Sounds," containing fome propofals for the improvement of Acouftics, printed in the Philofophical Tranfactions of the Royal Society of London. Biog. Brit.

Marsh, *Cape*, in *Geography*, a cape on the fouth coaft of New Georgia. S. lat. 9° 21′. E. long. 150° 56′.

Marsh *Creek*, a river of North America, which runs through Malden townfhip, in Upper Canada, and difcharges itfelf into lake Erie.

Marsh's *Ifland*, the largeft of a group of 13 iflands at the Great Falls in Penobfcot river, all lying within feven miles of one another. Marfh's ifland is about five miles long and two and a half wide, and eftimated to contain about 5000 acres. Round this ifland are five falls, one of which is diftinguifhed by the name of "The Great Falls," or "Old Town Falls."

Marsh-*Effluvia*, or *Miafmata*, in *Medicine*. See Effluvia and Miasma.

Marsh-

Marsh-*Fever*, the fever occafioned by refpiring the miafms, which exhale from fwampy ground. This is various under the different circumftances which produce it; but it is always a fever of paroxyfms, occurring at regular intervals. In temperate climates and cool feafons, it is an intermittent, or ague; in warm countries, in hot autumnal weather, it is a remittent, of tedious and difficult cure; and in the hot feafons of hot climates, it is the bilious remittent, or yellow fever, fo fatal to ftrangers recently arrived from colder latitudes. In an able treatife on yellow fever, lately publifhed by Dr. Bancroft (in 1810), it is fatisfactorily fhewn, that thefe different forms of fever are the offspring of the fame caufe; and that in proportion to the heat of the climate and feafon, to the comparative cold of the climate from which the patient has come, or of the feafon which has preceded, to the concentrated ftate of the miafmata, and to the full expofure which has been undergone, in the fame proportion will the fever commence more fpeedily, be more violent in its attack, and more rapid and dangerous in its courfe, and from thefe circumftances alone, all the varieties of periodic fevers, from the yellow fever, which commences within twelve hours, to the mild vernal ague, which lies dormant from autumn to the enfuing fpring, are produced. See Effluvia, Heat, Miasma, Remittent.

Marsh *Landers*, in *Rural Economy*, a term provincially applied to neat cattle of the fhort-horned breed, or fuch as are bred on lands of the marfh kind, in different places.

MARSHAL, or Mareschal, *Marefcallus*, primarily denotes an officer, who has the care or the command of horfes.

Nicod derives the word from *polemarchus*, *mafter of the camp;* Matthew Paris from *Martis fenefcallus*. In the old Gaulifh language, *march* fignified *horfe;* whence *marefchal* might fignify him who commanded the cavalry. Spelman, Skinner, and Menage, derive it from the German *maer*, *marre*, a *mare*, or even a *horfe*, and *fchalk*, *fervant;* which makes fome imagine the title was firft given to farriers, or thofe who fhod and bled horfes; and that, in fucceffion of time, it paffed to thofe who commanded them. Pafquier makes four feveral derivations for the four feveral kinds of marfhals in ufe among the French; *viz marfhals* of France, *marfhals de camp*, *marfhals de logis*, or quarter-mafters, and farriers, who are alfo called by the name of marfhals. The third he derives from *marche*, or *marchir*, *to mark*, *limit;* and the laft from *maire*, *mafter*, and *chal*, *horfe*.

That the marfhal was an officer of confiderable note in Germany, France, and elfewhere, muft incontrovertibly be acknowledged; but the exact time of the firft inftitution of his office cannot now be fo well afcertained. At firft, the marfhal or marefcallus was, probably, an officer of inferior rank, to whofe direction and management fovereign princes confided the care of their horfes. Some have fuppofed the marefcallus and the "Comes Stabuli" to have been the fame officer under different titles; whilft others, allowing the functions of thefe officers to have been originally different, contend that they were united in, and for a long time after their inftitution continued to be exercifed by, one and the fame perfon. This contrariety of opinion feems to have arifen from confounding the officers of the Weftern empire in its early ftate with thofe eftablifhed in it at a fubfequent period, as well as with thofe of France, Italy, and of the Eaftern empire. In the early times of the Weftern empire, whilft the "Comes Stabuli" remained a mere officer of the houfhold, and uninvefted with a military employment, no mention of a marefcallus occurs among the officers of the crown. In thofe times the "Marefcalli" were only minifterial to the "Comes Stabuli," and the fame difference fubfifted between them as between menial fervants and their mafters. The "Comes Stabuli" was a high officer of the emperor, who appointed him to that office, and committed to him the fuperintendency of the imperial ftables and ftud: whereas the "Marefcalli" were perfons acting under him in a fervile ftation, and employed in dreffing, feeding, and training a limited number of the emperor's horfes. Afterwards the promotion of the "Comes Stabuli" to the military dignity of commander-in-chief of the army, opened the way for the "Marefcalli" to emerge out of their obfcurity, and to rife to a more exalted ftation than they had before enjoyed: for on account of their fkill in the feveral branches of horfemanfhip and the management of cavalry, the "Comes Stabuli" felected one of them to reconnoitre the pofition and to watch the motions of the enemy; to affign the quarters and lodging for the foldiery; to ftation the piquets, and direct the foragers. The office of "Marefcallus," thus raifed from fervility, foon attained to great dignity and power; infomuch that the leading of the van of the army, the command of the cavalry, and the making of the firft attack on the enemy, were annexed to it. After the decline, and upon the new-modelling of the empire, the office of the "Comes Stabuli" was funk into that of the "Marefcallus," who from that time exercifed the functions of each, and became the moft confiderable officer in the ftate. The French, from almoft the earlieft times of their monarchy, had both Conftable and Marfhal. (See Constable.) The Marfhal is mentioned in the "Leges Salicæ," in the capitularies of Charlemagne, and by feveral of the contemporary writers of that age. The "Marefcallus," from his firft inftitution in France, was confidered as fubordinate to the Conftable, whofe minifter he was both in war and peace. His authority, however, was great, and in many refpects fo nearly equal to that of his principal, that his office was ever perfonal, and granted for life only. The French were fo jealous of the power of their marfhals, which became important from their prerogative of leading the van of the army, that they ufed every precaution for preventing the office from becoming hereditary in one family.

Among our Anglo-Saxon anceftors there was an officer, diftinguifhed by the appellation of "Heretog," or "Heretoche," (derived from hepe, *exercitus*, and togen, *ducere*,) who, according to the additions to the laws of king Edward the Confeffor, was the fame officer as the French ftyled either "Conftable," or "Marfhal." The identity of thefe officers has, however, been queftioned, and it has been alleged, that there were effential differences, as well in the conftitution as in the functions of thefe officers. Each county or fhire in England had its peculiar "Heretoche:" but in that age the French had only one "Conftable," or "Marfhal," in their kingdom in commiffion at the fame time. The "Heretochii" were military officers of the public, and each of them was annually elected by the common fuffrage of the people of his own county: whereas the "Conftable" and "Marfhal" of France were civil as well as military officers of the crown, appointed by the fovereign only, and generally for life. The power of the "Heretoche" extended no farther than to the leading of the forces of that particular county, by which he was chofen to be their military chief; but the authority of the "Conftable," and under him of the "Marfhal," extended over the whole national army. The "Conftable" of France was the third perfon in the kingdom in point of rank, and next to him was the "Marfhal;" but the "Heretoche," even in his own county court, was placed next below the fheriff, and

and immediately before the "Trithingreve." When the "Heretoche" had conducted the forces of his own county to that part of the kingdom where the king thought proper to assemble his army, and they had joined the main body, his command was superseded, and he himself became subject to the orders of the commander-in-chief; whereas the "Constable" and "Marshal" had the management and direction of the campaign, and the various operations of the war, acknowledging no superior in command except the king, when he was personally present. In time, the "Heretoche" was no other than a colonel of a county militia, acting under the commander-in-chief of the king's forces. Duke William, even before his invasion, and more especially afterwards, must have known the great difference between the officers of the Anglo-Saxons and those of the French and Normans too well to have interpreted the "Heretoche" by either "Constable" or "Marshal:" and if so, he cannot have been author of the additions to the Confessor's laws. These additions, it is supposed, were not formed till the latter part at least of the reign of king Henry II. and probably not till after his death; about which time the Germans and Italians, confounding together the two offices of "Constable" and "Marshal," not only used the words "Constabularius" and "Marescallus" as synonimous, but constantly gave the appellation "Constabilis" to the leader of every party and detachment of the soldiery.

We find the term "Marshal" used in the duchy of Normandy for an officer vested both with authority and jurisdiction, and that officer grown up there to the meridian of his dignity and power, before William's invasion of our island, and therefore, if we had not any positive evidence of the fact, yet it would be highly probable that he brought the name and office into England at the time of the conquest, in the same manner as the princes of the Norman lineage carried both to Sicily and Naples: and of this we are assured by the chronicle of Normandy, which expressly tells us, that the Conqueror made Roger de Montgomery and William Fitz-Osborne "Marshals" in England. This office, next to that of the "Constable," was conferred for several generations, in the family of the Clares, earls of Pembroke; after which, reverting to the crown, it was held by different great personages, till the 25th of Henry VIII, when it was granted to Thomas Howard, duke of Norfolk, and his heirs male for ever, with power to exercise it by deputy; since which time, it hath, with some interruptions arising from attainders, and other consequences of civil dissentions, continued in that family.

Mr. Madox (Hist. Excheq. c 2.), describing the office of the king's mareschal, or mareschal of England, says it was executed partly in the king's army, in time of war, and partly in his court, in time of peace. Of the military functions of this office he merely says, that he and the constable were to give certificates to the barons of their having duly performed the service required of them in the king's armies; which seems to shew that these officers had a legal superintendency over those armies. But from other accounts, it appears, that in the reign of Edward I., the mareschal's post was in the van-guard, and that it was his duty, and that of the constable, to muster the forces. (See Rymer, vol. ii. p. 783.) His civil duties were (as Madox has collected them from ancient records), to provide for the security of the king's person in his palace, to distribute the lodgings there, to preserve peace and order in the king's houshold, and to assist in determining controversies among them. He also performed certain acts, by himself or his substitutes, at the king's coronation, at the marriage and interments of the royal family, at the creation of barons and knights, and at other great and ceremonious assemblies in the king's court. It is said in the dialogue "De Scaccario," (already cited) that no business of importance ought to be done without his being consulted. See Earl-*Marshal*.

Besides the earl-marshal, there were, during the reigns of our Norman race of sovereigns, and also in subsequent and still later times, marshals, whose employments, or marshalseas, were different from, and subordinate to, those of that great officer. Our ancient records take notice of some officers by the name of marshals, who are mentioned only in general to have been servants of the king's houshold; and we find by the patent-rolls, that king Henry III. had no less a number of marshals than seven continually attending upon him in his court; for which service, each of them was paid by the keeper of the wardrobe, the yearly wages of twenty marks. This, indeed, will not seem extraordinary, when it is considered, that the being "marshal," or having the "marshalsea" of a thing, meant no more than being the director, or having the oversight, charge, or ordering of it. Accordingly, Mr. Madox specifies several officers of the king's houshold under the several denominations of marshals of his *horses*, of his *birds*, and of his *measures*.

The marshal, as well as the *Constable* (see that article), in consideration of the services which his office required, had various fees and emoluments, as well as certain rights and privileges; which belonged to him, partly as a military officer, and partly on account of his attendance about the king's court. They are specified by Grose in his "Military Antiquities," vol. i. p. 194, &c. and by Edmondson in his "Complete Body of Heraldry," vol. i. p. 66. It is hardly necessary to add, that at present the earl-marshal is not considered as a military officer.

Marshal *of England, Earl.* See Earl-*Marshal*.

Marshal, *Knight*, or *Marshal of the King's House*, is an officer, whose business, according to Fleta, is to execute the commands and decrees of the lord steward, and to have the custody of prisoners committed by the court of verge. Under him are six marshal's men, who are properly the king's bailiffs, and arrest in the verge of the court, when a warrant is backed by the board of green-cloth. The court where causes of this kind between man and man are tried, is called the *Marshalsea*, and is under the knight-marshal. See Court.

This is also the name of the prison in Southwark; the reason of which may probably be, that the marshal of the king's house was wont to sit there in judgment, or keep his prison.

There are some other inferior officers of this name; as

Marshal of the justices in eyre.

Marshal of the king's bench, who has custody of the prison called the king's bench in Southwark.

This officer gives attendance upon the court, and takes into his custody all prisoners committed by the court; he is fineable for his absence, and non-attendance incurs a forfeiture of his office. The power of appointing the marshal of the king's bench is in the crown. 27 Geo. II. c. 17. See Court *of King's Bench*.

In Fleta, mention is also made of a *marshal of the exchequer*, to whom the court commits the custody of the king's debtors, &c.

Marshal, or *Mareschal*, of France, was, during the monarchy, the highest dignity of preferment in the French armies. This dignity was for life, though, at its first institution, it was otherwise. They were then only the king's first ecuyers under the constable, but in time they became the constable's lieutenants in the command of the army,

army, the conſtable himſelf being then become captain-general. At firſt they were but two in number, and their allowance was but five hundred livres *per annum* in time of war, and nothing in time of peace; but in the reign of Francis I a third was added; Henry II. created a fourth. Since it has been various: Lewis XIV increaſed it to twenty. Their office at firſt was to marſhal the army under the conſtable, and to command in his abſence.

They did then what the *marſhals de camp* did afterwards; to which laſt they transferred their title, and the leaſt conſiderable part of their authority.

The firſt marſhal performed the office of conſtable in an aſſembly of the marſhals.

MARSHAL, *Arch.* See ARCH-*Marſhal.*

MARSHAL, *Clerk.* See CLERK-*Marſhal.*

MARSHAL, *Field.* See FIELD-*Marſhal.* This denomination is likewiſe given as an honorary rank to general officers who have no immediate command.

MARSHAL, *Provoſt.* See PROVOST.

MARSHAL, *Sub* See SUB-*Marſhal.*

MARSHALS *of Arms*, in *Heraldry*, have been ranged by ſome authors as a different order of officers of arms; and whilſt ſome have attributed this title to Purſuivants, others have aſſerted, that there are belonging to, and depending upon, the office and officers of arms, certain miniſters, whom they call marſhals to heralds. The word "marſhal," in this caſe however, ſignifies no other than a deputy to a king of arms, of a whole realm, or of any province or march within it, ſubſtituted and appointed to perform the duties of ſuch king of arms in his abſence, or when he happens to be employed in other offices of the public; and to be a ſort of coadjutor, or aſſiſtant to him, when he thinks proper to uſe him in that capacity. The denomination of marſhal is undoubtedly very ancient, in this country as well as in foreign parts; of which Edmondſon mentions many inſtances. Complete Body of Heraldry, vol. i.

MARSHALL, THOMAS, in *Biography*, was born at Barkby, in Leiceſterſhire, about the year 1621. He was inſtructed in grammar-learning by the vicar of his native town, and was, in 1640, entered at Lincoln college, Oxford, where, in the following year, he was elected a ſcholar on Trapp's foundation. When the civil wars broke out, he bore arms in defence of the king at his own coſt; and upon the approach of the parliamentary viſitors in 1647, he left the univerſity, went to the continent, and became preacher to the company of Engliſh merchants at Rotterdam and Dort. While he was abroad, he was, without his knowledge, elected fellow of his college, and made doctor of divinity. Theſe honours recalled him to his native country, and to Oxford, where he was elected rector of his college in the year 1672. He was afterwards appointed chaplain in ordinary to his majeſty; in 1680, he was preſented to the rectory of Bladon, near Woodſtock, in Oxfordſhire, and in the following year he was made dean of Gloceſter. He died at Lincoln college in 1685, and left all his books and MSS. to the public library, which did not already form a part of it, and the remainder he gave to Lincoln college. He likewiſe founded three ſcholarſhips, ſupported by rent-charges on different eſtates. He was a very learned man, and deeply ſkilled in the Saxon and Eaſtern tongues, and was eminent for his ſtrict piety, profound learning, and other valuable qualifications. He was author of "Obſervationes in Evangeliorum Verſiones perantiquas duas, Gothica ſcilicet et Anglo-Saxonica, &c." 4to. 1665. "An Epiſtle prefixed to Dr. Hyde's Tranſlation into the Malayan Language of the Four Goſpels;" and other pieces.

MARSHALLIA, in *Botany*, is a ſpecies adopted by profeſſor Martyn from Schreber, who named it in honour of Mr. Humphrey Marſhall, author of *Arbuſtum Americanum*, the American grove, or an alphabetical catalogue of foreſt trees and ſhrubs, natives of the American United States."—This work was publiſhed at Philadelphia, in 8vo. in 1785; and a French tranſlation appeared at Paris in 1788.—Nothing is known of *Marſhallia*, but from Schreber, and according to his generic character, it ſhould be placed between *Serratula* and *Pteronia*. Schreb. 810. Mart. Mill. Dict. v. 3.—Claſs and order, *Syngeneſia Polygamia Æqualis*. Nat. Ord. *Compoſitæ Capitatæ*, Linn. *Cinarocephalæ*, Juſſ.

Gen. Ch. *Common calyx* ſpreading, of numerous, linear-lanceolate, obtuſe, concave, nearly equal, permanent ſcales. *Cor.* compound, uniform, longer than the calyx; the florets hermaphrodite, equal, numerous, of one petal, funnel-ſhaped, villoſe; tube the length of the calyx; limb ſomewhat ventricoſe, divided into five, linear, rather erect ſegments, two of them more deeply ſeparated. *Stam.* Filaments five, capillary; anthers cylindrical, tubular, as long as the limb. *Piſt.* Germen ovate; ſtyle thread-ſhaped, a little longer than the ſtamens; ſtigmas two, recurved. *Peric.* none, except the permanent calyx. *Seeds* ſolitary, ovate, five-ſided, downy, with a crown of five ſmall, ovate, pointed, erect, membranous leaves. *Recept.* flat, chaffy; ſcales linear, a little dilated, and obtuſe at the top, green, the length of the calyx.

We are not aware that any ſpecies of this genus has been yet deſcribed. Willdenow has not enumerated any in his extenſive work, ſo that the above character is all that is at preſent known relative to the matter.

MARSHALLING *a Coat of Arms*, in *Heraldry*, ſignifies the due and proper joining of ſeveral coats of arms belonging to diſtinct families in one and the ſame ſhield, or eſcutcheon; by *impaling* and *quartering* (which ſee); or, according to Niſbet, marſhalling of arms is when enſigns of honour, or the entire arms of other families, are joined with the paternal ones of the bearer by partition lines, making diſtinct arms or compartments in one ſhield.

Marſhalling is alſo to be extended to the diſpoſition of the appurtenances of ſuch arms, in proper places without the eſcutcheon.

MARSHALLSVILLE, in *Geography*, a place of America, in Muhlenburg county, Virginia; in which is a poſt-office; 258 miles from Waſhington.

MARSHALSEA. See COURT *of Marſhalſea*.

MARSHAM, *Sir* JOHN, in *Biography*, a well known writer, born in 1602, at London, received his early education at Weſtminſter ſchool, from which place he was ſent to St. John's college, Oxford, where he took his degree of M.A. in 1625. He now made a tour on the continent, and returning to London, entered at the Middle Temple for the ſtudy of the law. In 1629 he viſited the Low Countries and Paris, in the ſuite of ſir Thomas Edmondes, embaſſador extraordinary to Lewis XIII. Reſuming his legal ſtudies after his return, he was appointed one of the ſix clerks in chancery in 1638. In the civil wars he adhered to the royal ſide, and was plundered of a conſiderable part of his eſtate, but on the reſtoration he was elected one of the repreſentatives in parliament for the city of Rocheſter, was reſtored to his place in chancery, and received the honour of knighthood; and in the courſe of two or three years after this he was created a baronet. He died in 1685, leaving behind him a character for great learning in the languages, hiſtory, and chronology. The firſt fruit of his ſtudies was "Diatriba Chronologica," in which he examines the principal difficulties occurring in the chronology of the Old Teſtament. He wrote the preface to the firſt volume of of the "Monafticon Anglicanum," but his principal performance is entitled "Canon Chronicus Ægyptiacus, Ebraicus, Græcus, et Difquifitiones." In this he propofed to the learned world the hypothefis of four collateral dynafties of Egyptian kings, reigning at the fame time over different diftricts of that country, in order to reduce the chronology of the Egyptian records to a conformity with that of the Hebrew fcriptures. Sir John fuppofes that the Jews derived their feveral rites from the Egyptians, and limits the prophecy of Daniel's weeks to the reign of Antiochus Epiphanes. He left at his death, in an unfinifhed ftate, a fifth book of his "Canon Chronicus," containing the Perfian empire. Biog. Brit.

MARSHFIELD, anciently *Meresfield*, in *Geography*, a market-town and parifh in the hundred of Thornbury, Gloucefterfhire, England, is fituated on the borders of Somerfetfhire and Wiltfhire, feven miles diftant from Bath, 13 from Briftol, and 102 from London. The manor was anciently part of the demefnes of the crown, but foon after the conqueft was given to the fee of Wells to be holden as of the honour of Gloucefter. It afterwards came to the earls of Gloucefter; William, the fecond earl, gave it to the abbey of Keynfham, which he had founded for Black canons, in the reign of Henry II. In this abbey the manor continued till the diffolution; fince which period it has paffed, by grants, defcent, and purchafe, to various poffeffors, and is now the property of Chriftopher Codrington, efq. The parifh of Marfhfield is fixteen miles in circumference; the town, which ftands in the centre, confifts principally of one ftreet, of a mile in length. It is governed by a bailiff, annually elected at a court-baron, whofe power, however, though he is attended by a ferjeant at mace, extends but little farther than the examination of weights and meafures. A weekly market is held on Thurfdays, which, with the two annual fairs, were firft granted to the abbot of Keynfham in the year 1262, renewed at various times, and finally confirmed by James I. In the population furvey, under the act of 1800, Marfhfield was ftated to contain 265 houfes, occupied by 1246 perfons. The chief trade of the inhabitants is malt-making, which is carried on to a confiderable extent. The parifh church is a fpacious ftructure, confifting of a lofty nave, two aifles, and a well finifhed tower. The whole building is in the ftyle of the age of Henry IV., and was probably erected by the abbot of Tewkfbury, to whom, at that period, the impropriation belonged. On the left hand of the high altar are three fubfellia, or ftone ftalls, with light canopies and finials, where the officiating priefts ufed to be feated.

Upon a great common, called the Downs, are the evident remains of ancient intrenchments; near which are five tumuli, or barrows; the largeft is called Ofwald's tomb. The traditional account of this being the grave of Ofwald, king of the Northumbrians, is not fupported by hiftory.

At a place called the Rocks, near the town, are three ftones fet up to mark the limits of the three counties of Gloucefter, Wilts, and Somerfet, which meet here in a point. Rudge thinks that from this circumftance originated the ancient name of the parifh, *meare* being an Anglo-Saxon word for limit or boundary. Rudge's Hiftory of the County of Gloucefter, 2 vols. 8vo. 1803.

Marshfield, a poft-town of America, in Plymouth county, Maffachufetts, bounded S. by Duxborough, and 36 miles S.E. of Bofton; incorporated in 1640, and containing 1266 inhabitants.—Alfo, a townfhip in Caledonia county, Vermont, adjoining to Calais on the N.W., and Peacham on the N.E.; containing 170 inhabitants.

MARSHPEE, or Mashpee, an ancient Indian town of America, in Barnftaple county, Maffachufetts, containing 155 inhabitants. In this town is an Indian church, but the number of Indians does not exceed 40 or 50 perfons.

MARSHY Hope, the N.W. branch of Nanticoke river, in Maryland.

Marshy *Lands*, in *Agriculture*. See Marsh-*Land*.

MARSICO Nuovo, in *Geography*, a town of Naples, in Principato Citra, the fee of a bifhop, fuffragan of Salerno; 18 miles N. of Policaftro.

Marsico *Vetere*, a town of Naples, in the Bafilicata; 14 miles S. of Potenza.

MARSIGLI, Lewis-Ferdinand, *Count*, in *Biography*, a foldier and philofopher, was born in 1658, of a good family, at Bologna. He was brought up from his earlieft youth in manly exercifes, but was, at the fame time, extremely attentive to his ftudies, particularly in mathematics and natural hiftory. In 1679, he accompanied a Venetian envoy to Conftantinople, where he employed himfelf in procuring information of all kinds relative to the Turkifh empire. The refult of his enquiries, he publifhed in "Obfervations concerning the Thracian Bofphorus," which he addreffed to Chriftina of Sweden: this work was publifhed at Rome in 1681. The remarks which he collected refpecting the civil and military ftate of the Ottoman empire, and the rife, progrefs, and decline of that power, did not appear till after his death. He remained at Conftantinople eleven months; and after his return he went to Vienna, and offered his fervices to the emperor Leopold. They were accepted, and his fkill in fortification was employed in conftructing works for the defence of the river and ifland Raab. He was rewarded with a company of infantry, but in a fhort time he fell into the hands of the Tartars, who fold him for a trifling fum to the governor of Temefwar, by whom he was carried as a flave to the fiege of Vienna, where he was again fold, and endured incredible hardfhips, till his friends found means of redeeming him. He was foon after this employed to fuperintend the cannon foundery at Vienna; and in the courfe of the employment, he made many experiments on the ftrength and action of gunpowder, which he communicated to the celebrated Viviani. He was entrufted with important commands in the army, and had a large fhare in the capture of Buda, from the plunder of which he fecured for his fhare feveral oriental manufcripts. He was raifed to the rank of colonel in 1688, and was deputed by the emperor to the pope for fome political negociations, which he conducted with great dexterity. During the remainder of the war he ferved in Hungary, where he was employed in conftructing bridges over the Danube and other rivers, and in protecting the encampments. From the variety of his talents, civil and military, he was in great efteem with the imperial commanders, and was frequently confulted on important occafions, and was at length appointed the imperial commiffioner for fixing the boundaries between the two empires in Hungary and Dalmatia. When the fucceffion war between the emperor and his allies broke out in 1702, he accompanied the king of the Romans to the fiege of Landau. He was afterwards fent with his regiment to garrifon the important fortrefs of Brifac, and acted as fecond in command under the count of Arco. Great diffentions prevailed between the two generals, and the place furrendered after a fhort refiftance. The court of Vienna inftituted a legal enquiry into the facts, in confequence of which Arco was beheaded, and Marfigli deprived of all his honours and employments. He attempted to procure a revifion of the fentence from the emperor, but being unfuccefsful in his efforts, he retired to Switzerland, and wrote a juftification of his conduct, and then applied his mind

mind with redoubled ardour to fcientific purfuits. Having fpent a good deal of time in admiring the wonders of nature in Switzerland, he vifited France, and took up his refidence near Marfeilles, where he cultivated his garden, and particularly examined all the productions of the fea-fhore. In 1709, count Marfigli was called from his retreat by pope Clement XI. to be placed at the head of his troops, but he foon found that he fhould gain no reputation in the papal fervice, and withdrew altogether from military life. He appeared now in a new character, and founded the "Inftitute of Bologna." His object was principally to promote the improvement of various branches of fcience, *viz.* aftronomy, chemiftry, natural hiftory, phyfics, and military architecture. He fpared no pains nor expence in obtaining inftruments adapted to the illuftration and advancement of fcience, and having the pope's confent to a new foundation, and fixed its laws and regulations, he folemnly confirmed the gift in 1712. The fenate of Bologna purchafed the principal palace in the city for its accommodation, an obfervatory was erected in it, profeffors were appointed, and the Inftitute took its proper form. The gratitude of his fellow citizens for this and other liberal acts performed for them, was expreffed in a decree for placing his ftatue in fome confpicuous fituation, but he fteadily refufed the honour. To avoid the confequences of fome litigious difputes, he accepted the employment offered by the pope of furveying the fea-coaft of the territories of the church, in order to fortify it againft the incurfions of the African corfairs. He made ufe of this opportunity to augment the materials for his natural hiftory, an object which he purfued in a tour through the whole mountainous tract of the diftricts of Bologna and Modena. After this he vifited Holland and England, and in the courfe of his journey formed an acquaintance with Newton and Halley, Boerhaave and Mufchenbroeck; he became a member of the Royal Society of London, and returned laden with books and fpecimens of natural hiftory for the Inftitute. At Amfterdam the bookfellers agreed to print the work which he had been preparing feveral years, and which was publifhed under the title of "Hiftoire Phyfique de la Mer," in the year 1725. In the following year he printed another great work, which was regarded as the moft valuable of all his pubications, entitled "Danubius Pannonico Myficus," in fix volumes folio. This is a defcription of the Danube in its Hungarian and Turkifh courfe. It commences with geographical and hydrographical obfervations; from thence it proceeds to the hiftory and antiquities of all the places wafhed by its ftream; to the mineralogy, zoology, and botany of its borders, and concludes with meteorological and phyfical remarks. In 1727, Marfigli prefented his Inftitute with the fcientific treafures that he had acquired in his laft travels, and in the following year fought a peaceful retreat in Provence, but a flight apoplectic attack induced him to return to his native city, where certain domeftic vexations to which he had been fubject through life, were now terminated by the death of his brother. One of the motives for his return was to attend to the education of that brother's fon, to which he thought himfelf bound by the obligations of duty, notwithftanding paft diffentions. A temporary amendment in his health proved but of very fhort duration, and he died November 1ft, 1730, at the age of feventy-two. The count was, according to the religion of his country, remarkably devout, and had a particular veneration for the Holy Virgin, to whofe efpecial care he attributed all the profperous events of his life. He was author of many other works, befides thofe that have been already referred to, among which may be mentioned "A Differtation on the Bolognian Phofphorus;" "Memoir concerning the Flowers of Coral;" "Differtation on the Generation of Fungi;" "On Trajan's Bridge," &c. Gen. Biog.

MARSILEA, in *Botany*, fo named by Linnæus, in commemoration of count Lewis Ferdinand Marfigli, founder of the Academy of Sciences at Bologna. (See MARSIGLI and LEMMA.) An error of the printer's in the latter requires correction; for *corolline* read *coralline.* Linn. Gen. 560. Schreb. 754. Mart. Mill. Dict. v. 3. Brown. Prodr. Nov. Holl. v. 1. 167. Spreng. Crypt. 207. t. 5. f. 42. Lamarck Illuftr. t. 863. (Lemma; Juff. 16.) Clafs and order, *Cryptogamia Filices*, Linn. *Cryptogamia Mifcellaneæ*, Schreb. Nat. Ord. *Filices*, Linn. Juff. *Marfileaceæ*, Brown.

Eff. Ch. Involucrum ovate, clofed, of many androgynous cells, in two rows. Anthers numerous, clustered round the bafe of the piftils, of one cell, with globofe pollen. Germens in two rows, feffile, oval.

Obf. Mr. Brown, who has moft recently inveftigated this genus, is by no means certain about its parts of fructification. He obferves that the reputed germens are full of a granular matter, whofe particles are nearly oval, pellucid, very eafily feparable, but not foluble in warm water. He has often remarked, in the centre of the germen, an oblong body of a larger fize, at firft fight homogeneous; but on being immerfed in water, it quickly diffolved into particles fimilar to the above. What is prefumed to be pollen, confifts of grains larger and more opaque than thofe found in the germen.

The ftem is creeping, throwing out tufts of fibrous roots here and there, and from the fame parts bearing numerous quaternate leaves, on long upright footftalks, about the bafes of which the fructification grows, clustered from the main ftem.

The *Salvinia* of Micheli, referred to *Marfilea* by Linnæus, is now by common confent feparated from it. See SALVINIA.

The fpecies of *Marfilea* are,

1. M. *quadrifolia.* Linn. Sp. Pl. 1563. Brown n. 1. (Lenticula paluftris quadrifolia; Mapp. Alfat. 166. t. 166. Lens paluftris altera; Camer. Epit. 853.)—Leaflets wedge-fhaped, fomewhat obovate, rounded, entire; fmooth, as well as the footftalks. Fruit fhorter than its ftalk. Native of various parts of the fouth of Europe, as well as in New South Wales, in watery places, creeping to a confiderable extent. The *footftalks* are from two to fix inches long. *Leaves* not unlike thofe of a Trefoil or *Oxalis*, except in confifting of four leaflets, which are fmooth, fpotlefs, and entire, with numerous fine parallel nerves; their bafe brown or purplifh. *Fruit-ftalks* either axillary, or united with the bottom of the footftalks, folitary or in pairs, firm, rigid and fmooth, half an inch to an inch long. *Involucrum* the fize of a fmall pea, ovate, oblique, with a fmall point, clothed with fhaggy deciduous hairs.

2. M. *hirfuta.* Brown n. 2.—"Leaflets wedge-fhaped, fomewhat obovate, rounded, nearly entire; hairy, as well as the footftalks. Fruit nearly feffile."—Gathered by Mr. Brown in the tropical part of New Holland, as well as near Port Jackfon. We have, from the ifles of Mauritius and Bourbon, fpecimens nearly anfwering to this definition, inafmuch as their *leaflets* are not quite entire, and are fomewhat hairy, as well as their *footftalks*; but the *fruit-ftalks* do not differ in proportion from the former, of which we rather fuppofe thefe fpecimens to be a variety.

3. M. *minuta.* Linn. Mant. 308. Syft. Veg. ed. 14. 902. (M. emarginata; Delile Ægypt. cum ic. nondum edit.)—

Leaflets

Leaflets wedge-ſhaped, deeply toothed at the ſummit. Fruit roundiſh, with two teeth at the baſe. Fruit-ſtalks rigid, ſcarcely longer than the fruit.—Native of Egypt. Very much ſmaller than M. *quadrifolia*, and remarkable for the deep inciſions, or teeth of its exactly wedge-ſhaped *leaflets*, which reſemble ſome *Medicago* or *Trigonella*. Theſe are paler beneath, and ſomewhat hairy, as well as their *footſtalks*. About four axillary rigid *fruit-ſtalks*, very little longer than the fruit itſelf, and ſlightly hairy, grow together, more or leſs combined at their baſe. The *fruit* is lateral, or oblique, at the end of each ſtalk, roundiſh, compreſſed, corrugated and hairy, with two teeth at the outermoſt angle of its baſe, where the ſtalk terminates; rounded at the other end, and not pointed there as in the firſt ſpecies. M. Delile has ſupplied us with a wild ſpecimen from Egypt, under the name of M. *emarginata*, by which this plant is deſtined to appear in the great work on that country, now publiſhing at Paris. We find no difference between this ſpecimen and the authentic ones of Linnæus, the native country of which is not marked upon them.

4. M. *coromandeliana*. Burm. Ind. t. 62. f. 2. (M. minuta β; Linn. Mant. 308.)—Leaflets wedge-ſhaped, ſomewhat obovate, nearly entire, ſmooth. Fruit elliptical, vertical, with two teeth at the baſe. Fruit-ſtalks capillary, thrice as long as the fruit. Native of Coromandel and Tranquebar, communicated by the Rev. Dr. Rottler. Nothing can be more diſtinct than this ſpecies from the preceding, with which it is confounded by Linnæus. Poſſibly the miſtake of the learned Swede, and the figure of Burrmann, may have led M. Delile to ſuppoſe his *emarginata* different from the *minuta*. The preſent is very much ſmaller, even than that, with capillary *fruit-ſtalks* equal in length to the *footſtalks*. The *fruit* too is eſſentially different, ſtanding vertically, not laterally, at the end of the ſtalk, and being elliptical, very ſtrongly corrugated. The *leaflets* are rounded at the end, and for the moſt part quite entire. They ſpread in the form of a croſs, as in the other ſpecies.

5. M. *anguſtifolia*. Brown n. 3.—"Leaflets lanceolate, ſomewhat toothed at the extremity; ſmooth when full grown."—Found by Mr. Brown in New Holland, within the tropic. Of this we have ſeen no ſpecimen.

MARSILLAC, in *Geography*, a town of France, in the department of Allier; 12 miles S. of Montluçon.

MARSILLY, a town of France, in the department of the Marne; 10 miles S. of Sezanne.

MARSOLLIER, James, in *Biography*, a writer of hiſtory, born at Paris in 1647, was brought up to the church, and took the habit of a canon-regular of St. Genevieve, and was ſent with others to Uſez, to reſtore order in the chapter of that city. He fixed his abode there, and was elected provoſt of the cathedral, a dignity which he ſoon reſigned in favour of Poncet, afterwards biſhop of Angers, and was then made archdeacon. He died in Uſez, in the ſeventy-eighth year of his age. His principal works were "L'Hiſtoire du Cardinal Ximenes," two volumes; "L'Hiſtoire de Henri VII. Roi d'Angleterre;" "Hiſtoire de l'Inquiſition et de ſon Origine:" this, which was firſt printed in one volume, 12mo., has been ſince reprinted with conſiderable additions in two volumes: "Hiſtoire de l'Origine des dixmes et autres Biens temporals de l'Egliſe;" "La Vie de St. Francois de Sales;" "Entretiens ſur pluſieurs Devoirs de la civile;" "Apologie d'Eraſme:" this laſt is an attempt to prove the attachment of Eraſmus to the Roman Catholic religion. The ſtyle of Marſollier is free and flowing, but not in the beſt taſte; his works are, however, ſtill read with pleaſure. Moreri.

MARSOM's Key, in *Geography*, a ſmall iſland in the Spaniſh Main. N. lat. 12° 5′. W. long. 82° 58′.

MARSON, a town of France, in the department of the Marne, and chief place of a canton, in the diſtrict of Chalons-ſur-Marne. The place contains 400, and the canton 7608 inhabitants, on a territory of 297½ kiliometres, in 18 communes.

MARSTA, a town of Sweden, in the province of Upland; 16 miles S. of Upſal.—Alſo, a ſmall iſland near the W. coaſt of Sweden, in the North ſea, N. lat. 56 47. E. long. 12° 31′.

MARSTON Moor, a place of England, in the county of York, memorable for a battle fought here in 1644, with which commenced the miſfortunes of king Charles. The Scottiſh and parliamentarian armies, having joined, laid ſiege to York, and prince Rupert, reinforced by the duke of Newcaſtle, determined to raiſe the ſiege. Both parties drew up on Marſton Moor to the number of 50,000, and victory was long in a ſtate of ſuſpence. Rupert, who commanded the right wing of the royaliſts, was oppoſed to Oliver Cromwell, who now firſt preſented himſelf to notice at the head of a body of troops, diſciplined by himſelf. After a ſharp conflict the cavalry of the royaliſts gave way, and thoſe of the infantry who ſtood next to them were alſo put to flight. Cromwell having driven his opponent from the field, returned to a ſecond engagement, which proved equally ſucceſsful. The prince's whole train of artillery was taken, and the royaliſts never afterwards recovered this defeat.

MARSTRAND, one of the moſt extreme among that cluſter of iſlands, which extends from the coaſt of Sweden. Marſtrand, from its ſtrength called the "Gibraltar of Sweden," is a rocky iſland in the Cattegate, about two miles in circumference. The town, which lies on the eaſtern ſide, contains 160 houſes, and 1200 inhabitants. It was declared a free port in 1776, and was the great reſort for the American veſſels, which were not permitted to enter into any other port of Sweden. This traffic enriched the town, particularly in 1780 and 1781. Since the peace, the commerce has greatly diminiſhed, and the inhabitants have derived their chief ſubſiſtence from the herring fiſhery, by means of the number of ſhips which, in bad weather, take refuge in the harbour, and by a contraband trade. Marſtrand is called a free port, but the exemption is imaginary: for although all goods are admitted into the town free of duty, yet they cannot be exported without paying the uſual cuſtoms: and they are ſubject to a very ſtrict ſearch. The harbour is ſecure and commodious, but of difficult entrance, and in tempeſtuous weather dangerous without a pilot. Each of the two entrances is commanded by two new batteries. The place is ſtill further fortified by the ſtrong citadel of Carlſtein, which ſtands on an eminence in the middle of the iſland. It was built, in 1682, by Charles XI., and taken by the Danes in 1719: but the fortifications have been ſince conſiderably ſtrengthened; and it is now deemed impregnable. On the top of the higheſt tower is a light-houſe, which commands an extenſive view of the Cattegate, ſprinkled with an aſtoniſhing number of rocks and iſlands. It is ſaid, that on account of the numerous rocks and ſhoals, that render this ſea dangerous, above 300 veſſels have been accuſtomed to take refuge annually in the harbour of Marſtrand. This place has of late very much declined in the number of houſes and of inhabitants: 18 miles N.W. of Gotheborg. N. lat. 57 54′. E. long. 11° 30′.

MARSUIN,

MARSUIN, in *Ichthyology*, a name by which many have called the phocæna, or porpesse, a fish too often confounded with the dolphin.

MARSUPIALE, in *Natural History*, a name given by Tyson to the creature commonly called the possum, or opossum. The peculiar distinction of this creature from all others, is its having a pouch, or marsupium, under its belly, into which it receives its young in time of danger: whence the name.

MARSUPIALIS Musculus, in *Anatomy*, a name given by Cowper, and some others, to a muscle on the thigh, called also by some, bursalis. It is that muscle, called by Albinus, Winslow, and the generality of modern authors, obturator internus.

MARSUPIUM Corneum, a name given by Spigelius, Cowper, and some other authors, to certain muscles, of the thigh, called by the French writers, les petits jumeaux, and by Albinus, gemini. Vesalius does not esteem them separate muscles, but calls them only carneæ portiones decimo femur moventium musculo attensæ, fleshy portions affixed to the tenth muscle of the thigh.

Riolan, who calls the pyriformis, or pyramidal muscle of the thigh, the quadrigeminus, or quadrigeminus prior, calls these the quadrigemini secundi & tertii. They are sometimes distinct, sometimes they grow together.

MARSY, François-Marie de, in *Biography*, a modern Latin poet, was born at Paris, and entered at an early period into the society of the Jesuits, where he cultivated his literary talents so successfully, that at the age of twenty he had acquired considerable reputation by his Latin poetry. His chief work in this department was entitled "Pictura," published in 1736. In this poem he passes over the mechanical part of the art of painting, and gives, as it were, a gallery of pictures, several of which are touched with much descriptive force. Some circumstances obliged him to quit the habit of the order, and he employed himself as a man of letters, and composed several useful works, among which were "L'Histoire de Marie Stuart," in three vols.: a translation of "Melville's Memoirs:" "Dictionnaire abregè de Peinture et d'Architecture:" "L'Histoire Moderne," being intended as a sequel to Rollin's Ancient History: of this he finished eleven volumes, and it was afterwards continued to twenty-six. In 1752 he published "Rabelais moderne, ou les Œuvres de Rabelais mise a la portée de la plupart des Lecteurs," eight vols. He has been much and deservedly blamed for not suppressing the indelicacies and obscenities of the author, as he undertook to abridge him by omitting the obscure and less interesting passages of his works. He was liable to a heavier censure for publishing, in 1754, "L'Analyse de Bayle," in four vols. 12mo., since reprinted in Holland. On account of this Marsy was, for a time, imprisoned in the Bastile. He died in 1763, while employed in writing the 12th vol. of his Modern History.

Marsy, Gaspard, an excellent sculptor, born at Cambray in 1624, where he acquired the principles of his art under his father, and in 1648 he went to Paris to perfect himself. In this journey he was accompanied by his brother Balthasar; they worked together some years, till at length they attracted the notice of M. de la Vrilliere, secretary of state, who employed them in the decorations of the hotel de Toulouse. After this they were engaged in the works carrying on at Versailles; their most celebrated performance was a group of tritons watering the horses of the sun in the baths of Apollo. Their last work in conjunction, was the tomb of John Casimir, king of Poland. After this Balthasar laid aside his profession, but Gaspard finished several other works that did honour to his reputation. In 1657 he was received into the Academy of Painting and Sculpture, was nominated professor in 1659, and chosen rector in 1675. He died in 1681, having survived his brother seven years. Gen. Biog.

MARSYAS, in *Ancient Mythology*, a native of Celænæ, a town in Phrygia, and son of Hyagnis, who flourished, according to the Oxford Marbles, 1506 years B.C. Marsyas was a famous performer on the flute, of which his father was said to be the inventor. He is represented by Diodorus Siculus (lib. iii. cap. 10.) as a man commendable for his wisdom and temperance. Having engaged in a musical contention with Apollo, he chose the people of Nysa, at that time the residence of Bacchus or Osiris, for judges. Apollo played at first a simple air upon his instrument; but Marsyas taking up his pipe, struck the audience so much by the novelty of its tone, and the art of his performance, that he seemed to be heard with more pleasure than his rival. Having agreed upon a second trial of skill, it is said that the performance of Apollo, by accompanying the lyre with his voice, was allowed greatly to excel that of Marsyas upon the flute alone. Marsyas, with indignation, protested against the decision of his judges, urging, that he had not been fairly vanquished according to the rules stipulated, because the dispute was concerning the excellence of their several instruments, not their voices; and that it was wholly unjust to employ two arts against one.

Apollo denied that he had taken any unfair advantage of his antagonist, since Marsyas had employed both his mouth and fingers in performing upon his instrument; so that if he was denied the use of his mouth, he would be still more disqualified for the contention. The judges approved of Apollo's reasoning, and ordered a third trial. Marsyas was again vanquished; and Apollo, inflamed by the violence of the dispute, flead him alive for his presumption.

Pausanias relates a circumstance concerning this contest, that had been omitted by Diodorus, which is, that Apollo accepted the challenge from Marsyas, upon condition that the victor should use the vanquished as he pleased.

It is natural to suppose that great provocation had been given on both sides, previous to a trial of skill, big with such serious consequences. And it appears from a passage in Apuleius, that the champions had tried their strength at invective and sarcasm, before the musical contest began. According to this writer, Marsyas was so foolish as to irritate the god, by opposing his own entangled hair, his frightful and shaggy beard, to the flowing locks, the finical effeminacy, and dainty cleanliness of his rival; for which he was hissed by all the muses and company present.

It is difficult to acquire a true idea of the character of this musician, as some ancient writers, in speaking of him, tell us that he was a man of talents and wisdom, while others represent him as an ignorant clown; just as Polonius, in our Shakspeare's Hamlet, is in some scenes a wise man, and in others an ideot.

Plato tells us that we are indebted to Marsyas and Olympus for wind-music; and to these two musicians is likewise attributed the invention of the Phrygian and Lydian measure. Marsyas is also said by some to have been the inventor of the double flute, though others give it to his father Hyagnis.

Antiquity has furnished us with several monuments of the punishment inflicted upon him by Apollo. He may be seen in Berger, in Maffei, and in Du Choul. The story is likewise well and fully represented in one of the ancient pictures dug out of Herculaneum. Here the vanquished musician is bound to a tree, the executioner standing by with a knife

knife in his hand, only waits for orders from the victor to flay him alive. Apollo is seated at a distance, with a lyre in one hand, and a plectrum in the other, and a muse by his side, preparing a garland for him in token of victory. A young man, on his knees, appears to implore his mercy; this is thought to be Olympus, the scholar of Marsyas, asking pardon for his master, or, perhaps permission to give him funeral obsequies, which, as we learn from Hyginus, he obtained.

And Diodorus informs us, that Apollo, soon repenting of the cruelty with which he had treated Marsyas, broke the strings of the lyre, and by that means put a stop, for a time, to any further progress in the practice of that instrument.

MART, denotes a great fair or market, for selling of goods, holden every year. See FAIR and MARKET.

MART, *Letters of*. See LETTERS and MARQUE.

MARTA, in *Geography*, a town in the duchy of Castro, on a river of the same name, where it issues from the lake of Bolsena; 11 miles E. of Castro.

MARTA, or *Martena*, a town of Hindoostan, on the coast of Malabar; 10 miles S. of Cochin.

MARTA, *St.*, a branch of the *Andes*; which see.

MARTA, *Santa*, or *St. Martha*, a province of South America, in the viceroyalty of New Granada, bounded on the N. by the Spanish Main, on the E. by Rio de la Hache and Maracaibo, on the S. by Santa Fé, and on the W. by Carthagena. This is a mountainous and very high country, extending in length about 300 miles, and in breadth about 200. The climate is hot and sultry, but the heat is mitigated by the winds which blow over the mountains covered with snow. The chief town is

MARTA, *Santa*, or *St. Martha*, which is a sea-port on the Spanish Main, founded in 1555; with a good haven defended by two forts, but of late considerably declined; the houses being now mostly constructed of wood and covered with straw. This was the place of arms of Quesada, the conqueror of New Granada; and was reduced to ashes, in 1596, by sir Francis Drake. It is now a bishop's see. The port is large and convenient, protected by lofty ridges, and has in front a round hill, which defends the city on the side of the snowy mountains, at the distance of three leagues. These mountains may be regarded as the termination of the main chain of the *Andes*; which see. The climate is less hot and more healthy than that of Carthagena; and the city is supplied with excellent water from the river Goegaira, or Guayra, which passes near it: the banks of the river being covered with beautiful groves of trees, and among others, some whose leaves bear an unctuous appearance, and are used as soap. The environs produce cotton, tobacco, some wine, cacao, Brazil wood, sugar, vanilla, and some wheat. Here is also abundance of cattle, and some mules are bred. The population of Santa Marta is not ascertained. At Carrizal, on the S. of Cape Vela, 16 leagues E. of the city of Santa Marta, there is a pearl fishery, which, under bad conduct, yields only about 30,000 dollars. At Ocana there are copper mines, and gold mines near the river Ariguana, 30 leagues from the city. Ornaments of tombac have been found in the tombs of the Indians. Estella, who has given a minute and interesting description of this province, says, that it only contains betwixt 25 and 30,000 souls, the population of a mere European town; 100 miles N.E. of Carthagena. N. lat. 11° 19′ 2″. W. long. 74° 4′ 30″. See NEW GRANADA.

MARTABAN, a sea-port town in a province of the same name, in the Birman empire. It was formerly a port of considerable eminence; but it has lost its distinguishing importance by the plunder and devastation of the Peguers and Siamese, and by the obstruction of the navigation into its harbour, occasioned by ships that were sunk in the river by order of the Birman sovereigns. N. lat. 16° 38′. E. long 98° 2′. See ARRACAN, AVA, BIRMAN *Empire*, PEGU, and SIAM.

MARTAGO, a town of Spain, in the province of Leon; 10 miles S.S.E. of Civdad Rodrigo.

MARTAGON, in *Botany*, a name given to several species of lily.

MARTANO, in *Geography*, a town of Naples, in the province of Otranto; 10 miles N.W. of Otranto.

MARTAWAN, a village of Syria, that lies on the road from Alexandretta to Aleppo, celebrated among the Turks and Europeans, on account of an extraordinary practice of the inhabitants, who let out their wives and daughters for a trifling sum. "This prostitution, held in abhorrence by the Arabs, seems to me," says Volney, (Trav. in Egypt, &c. vol. ii.) "to have originated in some religious custom, which ought perhaps to be sought for in the ancient worship of the goddess Venus, or to be attributed to the community of women permitted by the Ansarians, to which tribe the inhabitants of Martawan belong."

MARTEAU, in *Conchology*, the name given by French naturalists to a peculiar species of oyster, called also *malleum* by others. It is one of the most curious shells in the world. Its figure is that of a hammer, with a very long head, or rather of a pick-ax. It has a body of moderate thickness, and two long arms. It is of a brownish colour, with a beautiful tinge of a violet-blue. Notwithstanding the strange shape of these shells, they close very exactly.

MARTEAU, in *Ichthyology*. See SQUALUS *Zygæna*.

MARTEL, in *Geography*, a town of France, in the department of the Lot, and chief place of a canton, in the district of Gourdon; 29 miles N. of Cahors. The place contains 2711, and the canton 9952 inhabitants, on a territory of 187½ kiliometres, in 14 communes.

MARTELLI, LODOVICO, in *Biography*, was born at Florence in 1409, and became distinguished by his poetical genius, and, but for an early death, would have had a high rank among the literary characters of his age and country. He was author of many verses, as well in the burlesque as in the serious style; but is chiefly known for a tragedy, entitled "Tullia," which is much esteemed among the early productions of the Italian drama. He had a brother, Vicenzo, who was patronized by the prince of Salerno. On some account he was thrown into prison; on which occasion he made a vow to undertake a pilgrimage to Jerusalem, should he regain his liberty. This event took place; and he finally retired to a tranquil life, and died in 1556. A volume of his poems and letters was published in 1607: many of his letters also are to be met with in the collection of letters of illustrious men, published at Venice in 1564.

MARTELLI, PIETRO-JACOPO, an eminent Italian poet, born at Bologna in 1665, was educated first at the Jesuits' school, and afterwards at the university of his native city. His father would willingly have brought him up to the profession of physic; but the young man could not endure the practice, and was permitted to devote himself to the study of classical literature. When he was about thirty-two years of age, he obtained the post of one of the secretaries to the senate of Bologna. He published a serious poem, entitled "Gli Ocche di Gesu," *the Eyes of Jesus*. He next applied himself to tragedy, and having carefully perused the Greek and the French tragedians, he published "La Morte di Nerone." This and several of his other pieces were acted upon

upon different theatres, with great applaufe. In 1707 he was appointed profeffor of the belles lettres in the univerfity of Bologna, and foon after was made private fecretary to Aldrovandi, who had been nominated delegate to pope Clement XI. At Rome he contracted an intimacy with many men of high literary reputation, and was the means of renewing the affemblies of the academy of Arcadi. He publifhed about this period feveral tragedies, and a fingular dialogue, "Del Volo," *On Flying*, in which he endeavoured to prove that men and heavy bodies might be fupported in the air; and in the fame work he gave a defcription of a flying fhip, which he projected. He alfo wrote feveral difcourfes in verfe concerning the art of poetry. He next went to Paris with Aldrovandi, who was appointed the pope's legate at the courts of France and Spain, and became acquainted with the moft diftinguifhed men of letters, at whofe requeft he ftated at length his opinions "On ancient and modern Tragedy," in the form of dialogues, which were publifhed by his friends before he had revifed them for the prefs. On his return to Rome, in the courfe of nine months, he publifhed his tragedies in three volumes, and was reckoned to have conferred, by the work, a great benefit on Italian literature, by reviving a true tafte for this fpecies of compofition. In 1716 he was diligently occupied at Rome with a difpute between the cities of Bologna and Ferrara, concerning the derivation of the waters of the Reno and Po. His zeal in this bufinefs caufed him, in 1718, to be promoted to the vacant place of firft fecretary to the fenate. He wrote feveral other pieces befides thofe that have been referred to, and began a poem "On the Arrival of Charlemagne in Italy, and his Acceffion to the weftern Empire," which he never finifhed. He died in 1727, at the age of fixty-two. As a man, he was beloved for the fuavity of his manners and his focial qualities. As a poet, he was elevated and fplendid rather than eafy and natural, and a great admirer of his own productions. His principal works in profe and verfe were printed in nine volumes, 8vo., in the year 1729. Gen. Biog.

MARTELLIERE, Peter de le, who rendered his name celebrated as an advocate at the French bar, was the fon of a lieutenant-general. He came to Tours at the time that the parliament of Paris held its fittings there, and entering himfelf at the bar, followed the profeffion of a pleader during forty-five years, with a celebrity that placed him among the moft eminent advocates of his time. In 1611 he pleaded the caufe of the univerfity of Paris againft the Jefuits, and pronounced a moft bitter philippic on the fociety, which was much admired as well in print as on the delivery. It went through feveral editions, and was anfwered by fome perfon on the part of the fociety. Martelliere was afterwards created a counfellor of ftate. He died in 1631. He is ftyled, in his epitaph, "Princeps Patronorum, et Patronus Principum." Moreri.

MARTELLO, Cape, in *Geography*, the fouth point of the ifland of Negropont. N. lat. 38°. E. long. 24° 39′.

MARTENNE, Edmund, in *Biography*, a learned French Benedictine monk, was born in the year 1654. At the age of eighteen he took the vows in the abbey of St. Remi at Rheims, where he was greatly diftinguifhed among his contemporaries by the diligence of his application, and his profound laborious refearches. As an author he firft appeared in 1690, with a work, entitled "Commentarius in Regulam fancti Benedicti literalis, moralis, hiftoricus," which is a compilation of what the beft writers have faid on the fubject, and contains differtations on different queftions, which difplay the erudition of the author. He publifhed "De antiquis Monachorum Ritibus," in two volumes, 4to., which furnifhes much curious matter, illuftrative of ancient ecclefiaftical and profane hiftory. From this period he was frequently before the public by works of various merit; but his fame with pofterity is chiefly fecured by the part which he took in new-modelling the work, entitled "Gallia Chriftiana." To enable him to do this, it was determined that he fhould vifit the public archives, and the libraries of the churches and monuments throughout the kingdom, to fearch for fuch documents as had efcaped the knowledge and inveftigation of the original authors. On this literary miffion he fet out, and traverfed, alone, Poitou, Berry, Nivernois, and part of Burgundy. He fpent fix years in thefe travels, the refult of which was a rich harveft of materials, which, exclufive of more than two thoufand pieces illuftrative of the "Gallia Chriftiana," compofe the greater part of five volumes in folio, publifhed in 1717, under the title of "Thefaurus novus Anecdotorum," &c. In the fame year he publifhed, conjointly with his fellow-labourer, D. Urfin Durand, a particular account of their journey, entitled "Literary Travels of two Monks of the Congregation of St. Maur." Two years after, they took another journey by order of their fuperiors, and publifhed an account of it, under the fame title with the preceding. The refult of this fecond journey was an immenfe collection of documents, in nine volumes, folio, under the title of "Veterum Scriptorum et Monumentorum Hiftoricorum, et Dogmaticorum ampliffima Collectio:" of thefe the firft three appeared in 1724, and the fix laft in 1733. He was concerned in many other publications, particularly in father Mabillon's fixth volume of his "Annales Ordinis S. Benedicti;" and in the new edition of father d'Achery's "Spicilegium." He died in 1739, at the great age of eighty-five. He was refpected and beloved by his literary contemporaries, as well on account of the fimplicity of his manners as of the vaft extent of his learning, and his indefatigable induftry. Moreri.

MARTENS, Thierry, in Latin, *Martinus*, a native of Aloft, in Flanders, celebrated as the perfon who firft introduced the art of printing into the Netherlands; having exercifed this ufeful and noble art nearly fixty years at Aloft, Louvain, and Antwerp. He died at the laft-named place in 1553, at the age of four-fcore. He was an author as well as a printer; but it is faid his own productions were the leaft valuable of thofe that iffued from his prefs. He was highly efteemed by the learned men of the period in which he lived, and enjoyed the friendfhip of Erafmus, who lodged in his houfe. He employed the double anchor as a fign of the books that were printed at his office. Gen. Biog.

MARTHA Brae, in *Geography*, a harbour and village in Jamaica. N. lat. 18° 31′. W. long. 77° 32′. See Falmouth.

Martha, *St.* See *Santa* Marta.

Martha, *St.*, *Bay*, a bay on the W. coaft of the ifland of Curaçoa.

Martha's *Vineyard*, an ifland in the Atlantic, near the coaft of New England, belonging to Duke's county, Maffachufetts, called by the Indians "Nope," or "Capawock," lying between 40° 17′ and 41° 29′ N. lat, and between 70° 22′ and 70° 50′ W. long. W. of Nantucket; about 21 miles in length, and fix in breadth.

Martha's Vineyard, Chabaquiddick, Noman's ifland, and the Elizabeth iflands, which contain about 16,500 acres of valuable land, conftitute Duke's county, containing 3118 white inhabitants, and between 400 and 500 Indians and mulattoes; who fubfift by agriculture and fifhing. Cattle and fheep are raifed here in great numbers; and rye, corn,

 and

and oats are the chief produce of the island. White pipe-clay and yellow and red ochre are found in Martha's Vineyard.

MARTHALON, a town of Switzerland, in the canton of Zurich; 5 miles S. of Schaffhausen.

MARTIAGO, a town of Spain, in the province of Leon; 10 miles S. of Civdad Rodrigo.

MARTIAL, or MARTIALIS, MARCUS VALERIUS, in *Biography*, a native of Bilbilis, in Spain, where he was educated, and remained till he had arrived at man's estate, when he came to Rome. He was sent thither to study the law, but he was too much addicted to poetry to settle to a profession that requires great labour and severe study. His fine talents and taste for polite literature ingratiated him with the principal literary characters then in Rome, and even procured for him imperial patronage. Flattered with the notice taken of him, he became the panegyrist of the emperors, and in his turn gained the greatest honours, and was rewarded in the most liberal manner. Domitian gave him the tribuneship, but the poet, unmindful of the favours which he had received, after the death of his benefactor, exposed to ridicule the vices and cruelties of a monster, whom, in his lifetime, he had extolled as the pattern of virtue, goodness, and excellence. Trajan treated the poet with coldness; and Martial, after he had passed thirty-five years in the capital of the world, in the greatest splendour and affluence, retired to his native country, where he had the mortification to be the object of malevolence, satire, and ridicule. He received some favours from his friends, and his poverty was alleviated by the liberality of Pliny the younger, whom he had immortalized in his poems. Martial died in the 104th year of the Christian era, and in the 75th year of his age. He is unquestionably the most eminent of the epigrammatists, and is looked to as the sole model of that species of composition. He wrote fourteen books of epigrams, which are described by himself as "some good, some middling, and more bad;"

"Sunt bona, sunt quædam mediocria, sunt mala plura:"

this is thought by the best judges of compositions of the kind as sufficiently modest. The licentiousness of many of his epigrams deserves the strongest censure: the poet has in many instances shewn himself a declared enemy to decency, and the book is to be read by young persons with the utmost caution, as its tendency is often to corrupt the purity of morals, and initiate the votaries of virtue into the mysteries of vice. The best editions of Martial are those of Paris 1617, folio; Scriverii. 12mo. Lug. Bat. 1619; Schrevelii, 8vo. 1670. There are, as there ought to be, several castigated editions and selections for the use of schools.

MARTIAL, *St.*, in *Geography*, a town of New Mexico, in the province of Sonora; 48 miles S. of Pitquin.

MARTIAL is sometimes used to express preparations of iron, or such as are impregnated therewith; as the martial regulus of antimony, &c.

MARTIAL, *Court.* See COURT-*Martial*.

MARTIAL *Law*, is the law of war, depending upon the arbitrary, but just power and pleasure of the king, or his lieutenants. The king, though in times of peace he makes no laws but by the consent of his parliament; yet, in war, uses absolute power over the soldiery; though even this power hath been vested, of late years, in the king, or his generals of the army, by act of parliament, and under particular restrictions too.

Martial law, says sir Matthew Hale, is in reality no law, but something indulged rather than allowed as law. The necessity of order and discipline in an army is the only thing that can give it countenance; and therefore it ought not to be permitted in time of peace, when the king's courts are open for all persons to receive justice according to the laws of the land. The petition of *right* (which see) enacts that no soldier shall be quartered on the subject without his own consent; and that no commission shall issue to proceed within this land according to martial law. See *Martial* COURT.

MARTIALES FLORES. See FLORES *Martiales*.

MARTIANAY, JOHN, in *Biography*, a learned French Benedictine monk, was born at St. Sever, in Gascony, in the year 1647. Having entered into the order at Toulouse, in 1668 he applied with great diligence to the study of the Greek and Hebrew languages, with the view of obtaining a critical acquaintance with the sacred scriptures. When he had attained to that degree of competency in the pursuit which gave him confidence in his own powers, he perfected himself by reading lectures in different monasteries belonging to his order, and spent a considerable part of his life in endeavouring to illustrate them by various and very erudite publications. He was engaged jointly with father Pouget, in publishing a new edition of the works of St. Jerome, in five vols. folio, after which he gave the world a life of the saint. He was likewise author of "Historical Treatises on the Truth of the Inspiration of the Sacred Books;" a treatise "On the Canon of the Books of Scripture;" of one "On the Manner of explaining the Sacred Scripture:" he published also the "New Testament, with Notes taken entirely from the Scripture," and of a "Commentary on the Whole of the Scriptures." He died in 1717, about the age of seventy. Moreri.

MARTIANO, in *Geography*, a town of France, in the department of the Tanaro; 12 miles S.E. of Asti.

MARTIANUS CAPELLA. See CAPELLA, MARTIANUS.

MARTICHORA, in *Natural History*, the name given by the ancient Greeks to the animal which we call the manticora, or man-tiger.

MARTICK, in *Geography*, a township of America, in Lancaster county, Pennsylvania, having 1248 inhabitants.

MARTIGAO, a town of Portugal, in the province of Beira; 21 miles N.E. of Coimbra.

MARTIGNANA, a town of France, in the department of the Stura, near the Po; five miles W. of Saluzzo.

MARTIGNANO, a town of Italy, in the Trevisan; seven miles N.W. of Trevigio.

MARTIGNE', a town of France, in the department of the Ille and Vilaine; eight miles S S W. of La Guerche.—Also, a town in the department of the Mayenne; seven miles N.N.W. of Laval.

MARTIGNÉ *Briand*, a town of France, in the department of the Mayne and Loire; 15 miles S. of Angers.

MARTIGNÉ *la Comte*, a town of France, in the department of the Saône and Loire; 6 miles N. of Charolles.

MARTIGNY, which, according to antiquaries, was the ancient *Octodarum*, a village of Switzerland, in the Vallais, situated on a small plain, encircled by high mountains, and divided by the Dranse, that falls into the Rhone. This is a place much frequented by travellers; it leads to the Valley of Chamouny, to St. Maurice, and the lake of Geneva, and is the passage of the merchandize which is conveyed over the great St. Bernard into Italy. Near Martigny, are the majestic ruins of Le Bathin, an old episcopal castle, crowning the summit of a craggy rock, and impending over the impetuous Dranse.

MARTIGUES, LES, a town of France, in the department of the Mouths of the Rhone, and chief place of a canton, in the district of Aix; situated on an island at the mouth

mouth of a lake, to which it gives name, near the fea; the lake is near 20 miles long, and 12 broad; 14 miles S.S.W. of Salon. The place contains 7079, and the canton 10,947 inhabitants, on a territory of 297½ kiliometres, in fix communes.

MARTIN, BERNARD, in *Biography*, was born at Dijon, in 1574. He was educated for the profeffion of the law, and was admitted an advocate in the parliament of Burgundy, where he diftinguifhed himfelf by the erudition and eloquence of his pleadings. In 1605 he was called to the capital on an affair of fome confequence. Here he publifhed the refult of feveral years critical refearches into different ancient authors, under the title of Bernardi Martini Variarum Lectionum, lib. iv. After this he applied himfelf folely to his profeffional ftudies, and made large collections for a commentary on the cuftom of Burgundy, which he had juft put to the prefs when he died in 1639. Moreri.

MARTIN, faint, was born at Sabaria, in Pannonia, now denominated Hungary, about the year 316. He ferved in the army fome years, but being converted to Chriftianity he embraced a religious life, and was the means of converting his mother from the pagan doctrines. In 374 he had obtained fuch a reputation in the church that he was appointed bifhop of Tours, but his elevation to this high dignity did not lead him to banifh the original fimplicity, and even aufterity of the monk. He erected the monaftery of Marmontier, and is confidered as the apoftle of the Gauls. He died in the year 397. Under his name there is extant a confeffion of faith on the doctrine of the Trinity.

MARTIN I., pope, who obtained likewife the honour of the titles of faint and martyr in the Romifh church, was a native of Todi in Umbria, became prefbyter of the church of Rome, in 649, and was elected to the papal throne on the death of Theodore. It is not our bufinefs, in this place, to enter at large into the contefts which agitated the church at this period; they relate chiefly to the number of wills and operations in Chrift, one party maintaining the doctrine of one will and one operation, and the other, that of two wills and two operations. See MONOTHELITES.

As foon as Martin had taken poffeffion of his fee, he directed a council of bifhops to be affembled at Rome, who met at Rome to the number of one hundred and five. The debates were violent and protracted through five feffions, when by the influence of the pope it was decreed that the doctrine of two wills was the true Catholic doctrine, and that, of one will, plainly heretical. Martin next endeavoured to conciliate the emperor, and by a moft fubmiffive and flattering letter, endeavoured to convince him that the doctrine of one will was repugnant to the decrees of the councils, to the doctrine of the fathers, and to the belief of the church; and that therefore it had been of neceffity condemned. Conftans was not, however, fo eafily won over; he was enraged at the conduct of the pope, and determined to revenge the infult offered to the imperial laws, and without hefitation ordered the exarch of Italy, at all events, to feize and depofe Martin, and to fend him away prifoner. The officer performed the duty enjoined upon him with the utmoft promptitude. The pope, notwithftanding the remonftrances of the clergy, who offered to vindicate his authority, and to ftand by him to the laft, furrendered to the civil power, and was carried privately, with a few domeftics, on board a veffel in the Tyber, which was immediately difpatched to the Eaft. During a tedious voyage of three months, they touched at different places, at which the pope was not permitted to go on fhore, notwithftanding his fufferings from fea-ficknefs, the gout, and other diftreffing maladies. He was, moreover, cruelly deprived of fuch comforts and refrefhments as were brought to him by the clergy and others, who were driven away, and fometimes grofsly infulted as enemies of the ftate, and rebels to the emperor. When he had arrived at the ifland of Naxos, in the Archipelago, he was confined there a whole year, and then ordered to be brought to Conftantinople, where he arrived in the autumn of 654. Here he was clofely imprifoned and feverely maltreated for more than three months. He was at length brought to trial on a charge of high treafon, of which he was found guilty, without much regard to the nature of the evidence adduced; the verdict was however no fooner delivered than the high treafurer, who prefided as judge, ordered the guards to ftrip him, and the people to anathematize him; he was then delivered to the governor of Conftantinople, who directed an iron collar to be put about his neck, and to have him dragged through the ftreets of the city, loaded with chains, and then fhut up in prifon, till he fhould be led out to execution. Here he was treated with great barbarity, and would probably have died under his fufferings, had not the emperor been perfuaded to fpare his life. He accordingly banifhed him to the Sarmatian Cherfonefus, where he arrived in the fpring of 655. In this inhofpitable country, and in the midft of a pagan people, he had the mortification of finding himfelf entirely neglected by his friends in Italy, and fuffered even to want the common neceffaries of life. He died in the following September. There are ftill extant feventeen of his "Letters," in the fifteenth volume of the Collect. Conciliorum, which are faid to exhibit fuperior talents and an enlarged mind. Bower.

MARTIN II., pope, fometimes called Marinus I., the fon of a prefbyter, and a native of Gallefium in Tufcany, recommended himfelf to different popes by his great talents for bufinefs, and thus he rofe to the dignity of archdeacon of the Roman church. In 866 he was deputed by pope Nicholas to Bulgaria and Conftantinople, for the purpofe of excommunicating the patriarch Photius; and again in 869 by pope Adrian II. to fit in the general council convened in oppofition to that patriarch. Ten years afterwards he was fent legate to Conftantinople, a third time, by pope John VIII. to renew the act of excommunication. By the laft named pontiff he was probably ordained bifhop, but without a fee. Upon the death of John, in 882, he was elected his fucceffor; and Platina fays that he was indebted for his elevation to wicked practices, of which there is certainly no mention made by any of the more ancient writers. One of the firft meafures of his adminiftration was to declare the acts of the late council of Conftantinople null and void, and to anathematize all who fhould communicate with Photius, or acknowledge him as lawful patriarch. Thefe proceedings gave fo great offence to the emperor Bafilius, that he would not own him for lawful pope. Another meafure of pope Martin's government, was his reftoration of Formofus, bifhop of Porto, to his fee, though he had been repeatedly excommunicated by his predeceffors, and even obliged to fwear that he would never refume the epifcopal functions. Martin abfolved him from the obligation of his oath, declaring him innocent of the crimes laid to his charge, and replaced him in his bifhopric. Nothing more of moment is recorded of this pontiff. He died before he had prefided over the holy fee eighteen months. We have remaining of his works "A Conftitution for the Benedictine Monaftery in the Diocefe of Limoges," which may be found in the ninth vol of the Collect. Concil. Bower.

MARTIN III., pope, fometimes known by the name of Marinus II., probably a Roman by birth, fucceeded to the papal dignity on the death of the eighth, or, as others affirm, the ninth Stephen, in the year 942. Little is known of this pope, except that he was too much attached to the fyftem of monkery,

monkery, and granted very extraordinary privileges and exemptions to what were called religious men and houfes. He died in 946, after a pontificate of about three years and a half. He was a great friend to the poor, and was liberal in building, repairing, and adorning churches; and is defervedly praifed for his endeavouring to reconcile the Chriftian princes who were engaged in bloody wars. Bower.

Martin IV., pope, whofe original name was Simon de Brie, or de Brion, was defcended from an illuftrious family, and born at Montpenfier, in the Touraine. He many years held diftinguifhed offices in the church, and in 1260 was appointed keeper of the feals to Lewis IX.: in the following year he was created cardinal by pope Urban IV., after which he fuftained the character of papal legate in France, both under that pope, and under Gregory X. After the death of Nicholas III., and when the Roman fee had been vacant more than fix months, he was elected to fill it in February 1281, and upon his promotion to this high honour he affumed the name of Martin, avowedly in honour of St. Martin of Tours, of which church he had been canon. From the moment of his acceffion, his whole attention was directed to the promotion of the Roman hierarchy. With the defign of favouring the views of Charles, king of Sicily, on the Greek empire, and the city of Conftantinople, and with the view of rendering the influence of the papal fee triumphant in the Eaft, he excommunicated the emperor Michael Palæologus, under a very flight and flimfy pretext, of his having broken the peace which had been concluded between the Greek and Latin churches, at the council of Lyons, in the pontificate of Gregory X. This defign was entirely defeated by the famous confpiracy known by the name of the Sicilian *Vefpers*, (which fee,) by which all the French in the ifland were butchered, and the revolution effected that feated Peter, king of Arragon, on the throne of Sicily. The pope immediately thundered out the moft dreadful anathemas againft all the perfons concerned in this atrocious deed, and when Peter landed in the ifland, and was crowned king, he wrote feveral threatening letters to him, demanding that he fhould inftantly refign his pretenfions, and withdraw from a country which belonged to the apoftolical fee, upon pain of excommunication, and the forfeiture of his own kingdom. The king fet his holinefs at defiance, and avowed his determination to keep poffeffion of Sicily, as the inheritance of his wife, and he was readily obeyed by the clergy in both his kingdoms, whom he commanded to continue in the regular exercife of their functions, notwithftanding the interdict. Irritated at Peter's refiftance, the pope, by a bull. deprived him of the kingdom of Arragon, and his other dominions in Spain, which he declared to be forfeited, and that they fhould be the property of any prince who would feize them. In derifion of the pope's pretended power to deprive him of the regal title, the king of Arragon ftyled himfelf "Peter, a gentleman of Arragon, the father of two kings, and lord of the fea." Martin, anxious for revenge, offered the dominions of Peter to Philip of France, and to affift him in the feizure, his holinefs granted him the tenth of the ecclefiaftical revenues, and encouraged his fubjects to flock to his banner, by granting indulgences to all who fhould engage in that holy war. While he was meditating other projects, as well for the humiliation of the rebellious monarch as for the glory of the Roman hierarchy, he was cut off by a fudden death in 1285, after a pontificate of four years. There are five of his "Letters," and the fentence which he pronounced againft Peter of Arragon, in the 11th vol. of the Collect. Conciliorum. Befides thefe, there are thirteen of his letters in Waddingi Annal., and in the appendix to this work. Moreri. Bower.

Martin V., pope, whofe former name was Otho, or Eudes Columna or Colonna, was a defcendant from a branch of an ancient and well-known family of that name. He ftudied canon law at Perugia, and was created prothonotary and referendary by pope Urban VI. He was appointed nuncio to the Italian ftates by Boniface IX., and raifed to the purple by Innocent VII. He adhered to the interefts of Gregory XII. till he was depofed by the council of Pifa. He was appointed apoftolical legate for the patrimony of St. Peter, and vicar general of the apoftolical fee in Umbria; in which employments he gave the moft perfect fatisfaction to his employers. Upon the depofition of pope John by the council of Conftance, in 1417, he was elected to the papal dignity, and took the name of Martin V. On his coronation he was conducted on horfeback through the city in pontifical attire, by the emperor on foot, holding his bridle, on the right hand, and the elector of Brandenburg on the left, and followed by a crowd of princes and the whole council. After diffolving the council of Conftance, in the year 1418, Martin fet out on his return to Italy, with the view of endeavouring to terminate the civil war in which the city of Rome and the whole patrimony of St. Peter had been fome time involved. In his progrefs he fpent fome time at Geneva, where he received the ambaffadors of the city of Avignon, and from that city he difpatched a legate into Bohemia, who made a fruitlefs effort to quell the difturbances in that kingdom, which had been excited by the denial of the cup in the facrament to the laity, and the execution of Hufs and Jerome of Prague. Martin next went to Milan, where he was received with extraordinary marks of honour. After this he vifited Mantua, Ferrara, Ravenna, and came to Florence in the beginning of the year 1419. Here he continued about two years, which were fpent in reducing the tyrants who had feized the cities in the ecclefiaftical ftate, or fuch places as had revolted againft the papal authority. In a fhort time after, he had the fatisfaction of feeing Balthafar Coffa, formerly John XXIII., throwing himfelf on his mercy, and his fubmiffion was followed by a fplendid embaffy from Joan II., queen of Naples, to do him homage in her name, and to requeft that his holinefs would fend a legate to perform the ceremony of her coronation. Immediately after this ceremony, Joan caufed all the places which her predeceffor Ladiflaus had feized in the ecclefiaftical ftate to be reftored, and alfo fent James Sforza, a foldier of fortune, with the flower of her army, againft Braccio of Perugia, who had made himfelf mafter of many cities belonging to the church, and of Rome itfelf, which he governed under the title of "Defender of the City of Rome." Sforza was defeated, and purfued with great flaughter to the borders of the kingdom of Naples. The pope inftantly excommunicated the conqueror, who, to fhew his contempt for fuch kind of hoftility, in his turn excommunicated the pope and all who adhered to him. Through the mediation of the Florentines, an agreement was foon concluded between Braccio and the pope, the former confenting to deliver up Rome, and fome other cities to the pope. Martin refolved to go to Rome, which he entered in September, 1420, and was received with the loudeft acclamations of joy by the clergy, the fenate, and the people, who hailed his approach as their deliverance from abfolute deftruction. At this period, the city was but little better than a heap of ruins, and the inhabitants almoft ftarving. To remedy thefe evils, Martin applied himfelf with the utmoft zeal and vigour, and in lefs than two years he acquired the title of Romulus II., by his exertions to to promote order and regularity, and to restore the city to its ancient splendour and beauty. In the mean time Peter de Luna, under the name of Benedict XIII., continued to act the part of sovereign pontiff, and at his death, in 1424, Giles de Munion was elected his successor, by the name of Clement VIII., who was supported by Alphonso of Naples. When Martin sent a legate to this prince, in 1426, to remonstrate with him on his being the only Christian prince who upheld the schism in the church, Alphonso prohibited the legate from entering his dominions, and likewise forbad the bishops, and other ecclesiastics, to receive any letters from the pope on pain of forfeiting their dignities and revenues. Alphonso, after this, was glad to come to an accommodation with his holiness, which, after protracted negociations, was effected in the year 1429. It was agreed that the anti-pope and his cardinals should resign their dignity, submit to Martin, receive absolution from the legate, and be provided for with considerable benefices. Thus terminated the schism, known by the name of the "Great Western Schism," after it had lasted more than half a century. Martin was now left without a rival, and he immediately turned his attention to promote crusades against the Hussites of Bohemia. He died of a stroke of apoplexy in 1431, having been at the head of the church more than thirteen years. Martin was a decided enemy to reformation in the church, and disposed, generally, of lucrative employments to his relations, in preference to all others, however deserving. Fifteen of his "Letters," "Bulls," and "Constitutions," are to be met with in the twelfth volume of father Labbe's Concil. Maxim. Others are also to be found in "Bzovii Annal." and in the first volume of Laertius Cherubini's "Magnum Bullarium," &c. Bower.

Martin, a Catholic prelate in the sixth century, was by birth a Pannonian, or Hungarian, who quitted his native country when he was very young, and travelled into the East, for the purpose of visiting Jerusalem and the holy places. From Palestine he went into Spain, where he converted great numbers of people to what was called the Christian faith, and founded many monasteries. He was present at the second council of Braga, in 563, and presided at the third council in the year 572. He died in 572, and left behind him many very learned works, of which the most important is entitled "Collectio Canonum Orientalium," consisting of eighty-five canons of the Greek church, translated into Latin by himself. They are to be met with in all the collections of the councils, and in them the pretended "Apostolical Constitutions" are never cited. Moreri

Martin, Benjamin, a celebrated optician and experimental philosopher, was born in the year 1704. He was the son of a farmer, and became in early life a school-master at Chichester, where he wrote some excellent books on mathematical subjects. The profits of his profession probably enabled him to procure, by degrees, a good apparatus of philosophical instruments, with which he commenced lecturer in experimental philosophy, and travelled for some time in that character through different parts of the kingdom. He next appeared in the same profession in London, and delivered his courses to crowded audiences for many years. He finally settled in Fleet-street, London, as an optician, and made several important improvements on mathematical and philosophical instruments. The growing infirmities of age, obliged him to quit the active part of his business, and, trusting too much to others, his affairs became embarrassed, and he was made a bankrupt, though it was found his effects were more than sufficient to discharge all his debts. His mind was not equal to the shocks of adversity, and in the moment of despondency he attempted to destroy himself. He did not succeed in the effort, but the wound which he inflicted hastened his death, which took place in 1782, when he had attained the age of seventy-eight. His works are numerous, and were exceedingly valuable at the time of their publication. Some of them retained a large share of popularity till within the last twenty years, particularly his "Philosophical Grammar;" "The young Trigonometer's Complete Guide," in two vols. octavo; "The Philosophia Britannica," or "System of the Newtonian Philosophy," in three vols. octavo. He had, during his long life, formed a capital collection of fossils and other curiosities, which were sold after his death. "As an artist," says his biographer, "he was industrious and ingenious; and, as a writer, he possessed the happy method of explaining his subject; he wrote with perspicuity and even elegance."

Martin, David, a French Protestant divine in the 17th and the early part of the 18th centuries, was born at Revel, in the diocese of Lavaur, in the year 1639. Having passed through his academic studies with credit and applause, he was admitted M. A. and doctor of philosophy in the year 1659. After this, he applied himself to the study of divinity; to that of the sacred scriptures, the oriental languages, ecclesiastical history, and the different branches of profane as well as sacred literature. In 1663, he settled as pastor, and officiated in the ministry till the revocation of the edict of Nantes in 1685. After this, and the demolition of his place of worship, it being discovered that he still maintained a private connection with his church, he narrowly escaped an arrest, and withdrew to Holland. In 1686, he was invited to become professor of divinity, and pastor of the Walloon church in Deventer; but the regency of Utrecht, where he had taken up his residence, prevailed upon him to accept the office of pastor in their city. He afterwards received invitations from several other churches, both in the republic and abroad, and particularly from that of the Hague, which he declined. He now employed himself in giving lectures in philosophy and divinity, and acquired so high a reputation by his successful manner of instructing his pupils, that young persons of high rank, and even the sons of sovereign princes, were placed under his tuition. He had deeply studied the nature and genius of his own language, and when the French academy was about to publish the second edition of their Dictionary, he sent them remarks and observations, of which they availed themselves, with polite acknowledgments to the author. He died in 1731, having completed his eighty-second year. He was author of many learned works, among which is an edition of "The New Testament, according to the Geneva Version, with Corrections, Notes, New Prefaces, &c.;" "A History of the Old and New Testament," in two vols. folio, embellished with upwards of 400 engravings; "A Treatise on Natural Religion;" and one on "Revealed Religion," in two volumes octavo. This was his last work, the second edition of which bears the date 1720. Moreri.

Martin, Claude, an officer in the British military service in India, was by birth a Frenchman, of rather a mean descent. He had sufficient interest to get a good mathematical education at a public school, and at the age of 20 entered into the army. His regiment was sent to India with general Lally, and, in the war of 1756, he behaved with great gallantry, but being ill-treated, he enlisted into the English service, in which he rose to the rank of colonel. Being employed to make a map of the estates of the nabob of Oude, he recommended himself to his patronage. Martin was enabled, under the protection of the nabob, to open a profitable bank, and to embark in other commercial speculations, by which he gained a deal of wealth. At Lucknow he built a curious manfion in a ftyle of his own, in which he could enjoy all the mildnefs and coolnefs of an European climate with the fervour of the Afiatic. He erected another of the fame kind on the banks of the Ganges, which he fortified in the European manner. He formed a large mufeum of natural hiftory; conftructed an immenfe garden, which he ftocked with a prodigious variety of plants; and built an obfervatory, which he furnifhed with the beft aftronomical inftruments he could obtain. He died in the year 1799, bequeathing the great wealth which he had amaffed principally in charity.

Martin, in *Geography*, a fmall ifland near the W. coaft of Scotland, at the entrance of Loch Broom. N. lat. 57° 55'. W. long. 5° 5'.

Martin, a county of Halifax diftrict, North Carolina, adjoining Tyrrel, Halifax, Bertie, and Pitt counties, containing 5312 inhabitants, of whom 1646 are flaves.

Martin, *Cape*, a cape of Spain, on the coaft of Valencia. N. lat. 38° 47'. E. long. 0° 3'.

Martin, *St.*, *Cape*, a cape on the N. coaft of New Spain, in the North fea.

Martin, *St.*, one of the northernmoft of the Caribbee iflands in the Weft Indies, fituated between Anguilla on the N. at the diftance of 1½ league, and St. Bartholomew on the S.E. at the diftance of 15 miles. This ifland is chiefly valuable for its falt-pits and falt-water lakes, which were held in fuch eftimation by the Spaniards, that they erected a fort upon the ifland to protect them, and to prevent other nations from making a fettlement. The falt-lakes abound in good fifh and turtle; and the falt-water pools are the haunts of birds in great number. In this ifland there is no frefh water, except that which falls from the clouds and is preferved in cifterns. In the woods are wild hogs, turtle-doves, and an innumerable multitude of parrots. Here are alfo various trees producing gums, and plenty of the candle-tree, fplinters of which, when dried and lighted, emit a very fragrant fmell. Its tobacco, which is the chief commodity that is cultivated, is reckoned the beft in the Caribbee iflands.

In 1659 the Spaniards abandoned this ifland, blew up its fort, and deftroyed all the houfes and cifterns of the occupiers. The French and Dutch afterwards fhared the ifland between them; but in the year 1689 they were attacked and plundered by fir Timothy Thornhill, and in 1744 the French were driven out by the Britifh forces, and did not return till after the peace of 1763. The two colonies breed poultry and fheep, which they fell to the other iflands; and they alfo cultivate a little cotton and coffee. About forty years ago the French part contained 400 white families, and 10,000 flaves. The Dutch part comprehends fixty families, and about 200 flaves. In March 1801, this ifland was taken by the Britifh. On the N.W. fide it has commodious harbours and bays. N. lat. 18° 5'. W. long. 62° 55'.

Martin, *St.*, a town of Hungary, on a fmall river which runs into the Waag; 10 miles W. of Rofenburg.—Alfo, a town of Mexico, in the province of Zacatecas; 95 miles S.W. of Zacatecas.—Alfo, a town of Naples, in Capitanata; 10 miles S. of Termola.—Alfo, a town of Spain, in Afturia; 44 miles W. of Oviedo.—Alfo, a town of Spain, in Old Caftile, on the Duero; 42 miles S.S.W. of Burgos.—Alfo, one of the Scilly iflands. N. lat. 50°. W. long. 6° 14'. (See Scilly *Iflands*.)—Alfo, a town of the ifland of Cuba; 130 miles S.W. of Havannah.—Alfo, a town of France, in the department of the Po; nine miles N.W. of Pinerola.—Alfo, a town of France, in the department of the Dora; 18 miles S.E. of Aofta.—Alfo, a town of France, in the department of the Maritime Alps; 19 miles N. Nice.—Alfo, a town of Sweden, in South Finland; 30 miles N.E. of Abo.—Alfo, a town of South America, in the government of Moxes; 180 miles N.N.E. of Trinidad.—Alfo, a fmall ifland in the Pacific ocean, near the coaft of Peru. S. lat. 11°.

Martin *d'Auxigny*, *St.*, a town of France, in the department of the Cher; fix miles N. of Bourges.

Martin *d'Auxy*, *St.*, a town of France, in the department of the Saône and Loire; 12 miles S.W. of Chalons fur Saône.

Martin *le Beaux*, *St.*, a town of France, in the department of the Indre and Loire, near the Cher; nine miles E.S.E. of Tours.

Martin *le Chapelle*, *St.*, a town of France, in the department of the Lozere; 12 miles S.W. of Mende.

Martin *de Cleles*, *St.*, a town of France, in the department of the Ifere; 21 miles S. of Grenoble.

Martin *de Courtifols*, *St.*, a town of France, in the department of the Marne; fix miles E.N.E. of Chalons fur Marne.

Martin *d'Euriage*, *St.*, a town of France, in the department of the Ifere; five miles S.E. of Grenoble.

Martin *de Fontenay*, *St.*, a town of France, in the department of the Calvados; four miles S. of Caen.

Martin *de Londres*, *St.*, a town of France, in the department of the Herault; 12 miles N.N.W. of Montpellier.

Martin *de Palières*, *St.*, a town of France, in the department of the Var; nine miles N. of St. Maximin.

Martin *de Ré*, *St.*, a town of France, in the department of the Lower Charente, on the N. coaft of the ifle of Ré; nine miles W.N.W. of La Rochelle. N. lat. 46° 12'. W. long. 1° 38'.

Martin *de Tournon*, *St.*, a town of France, in the department of the Indre; feven miles N.W. of Le Blanc en Berry.

Martin *de Trebejo*, *St.*, a town of Spain, in the province of Leon; 41 miles S. of Cindad Rodrigo.

Martin *de Vallamas*, *St.*, a town of France, in the department of the Ardèche; 21 miles S.W. of Tournon.

Martin *Zell*, *St.*, a town of Bavaria, in the principality of Kempten, on the Iler; fix miles W.S.W. of Kempten. N. lat. 47° 38'. E. long. 10° 13'.

Martin *Var*, *Iflands of*, three fmall rocky iflands, which, according to Peroufe, are mere rocks in the Atlantic ocean; the largeft being about a quarter of a league in circumference. At a diftance they appear like five heads of land. S. lat. of the largeft 20° 31'. W. long. 28° 8' from Paris.

Martin's, *St.*, *Bay*, a bay on the S. coaft of the ifland of Guernfey.

Martin's, *St.*, *Point*, a cape on the S.E. coaft of Guernfey, two miles S. of St. Peter.—Alfo, a cape on the W. coaft of Africa. S. lat. 32° 40'.

Martin's, *St.*, *Iflands*, a clufter of fmall iflands in lake Huron. N. lat. 45° 33'. W. long. 84° 20'.

Martin, *Martlet*, or *Martinet*, in *Ornithology*. See Hirundo *Urbica*.

Martin, or *Martlet*, in *Zoology*, the name of a creature of the weafel kind, being the *muftela martes* of Linnæus, with cloven feet, body of a deep yellow colour, approaching to black, and whitifh throat. There are two fpecies of this creature, the one called the *martes abietum*, or fir-martin; the other the *martes fagorum*, or beech-martin. The beech-martin is diftinguifhed from the other by having a larger and blacker tail, and being all over of a darker colour, and by by being white on the throat; whereas the others are yellow; but the ſpecies are ſcarcely kept up diſtinct, the creatures mixing with one another in the breed. When diſtinct, the beech-martin is found to be a much tamer creature than the other, and may be kept about houſes like a cat; and often lives of its own accord about houſes, and among old walls. Their ſkins make a valuable fur; and that of the fir-martin, or yellow kind, is much the moſt valuable: prodigious numbers of their ſkins being annually imported from Hudſon's Bay and Canada.

The martin is of the ſize of a cat, but long-bodied; its legs are alſo ſhorter, and its claws leſs ſharp and ſhorter. Its whole body is covered with hair of a yellowiſh-black, except only the throat, which, in the beech-martin, or tame kind, is white; and in the wild kind, or fir-martin, yellow: its teeth are ſharp and ſtrong, and the dog-teeth, in particular, ſtand out a great way.

The beech-martin, with us, inhabits woods, makes its lodge in the hollows of trees, and brings from four to ſix young at a time. It makes great havock among poultry, game, &c. and will eat mice, rats, and moles. The pine, or fir-martin, inhabits the north of Europe, Aſia, and America; and is found alſo in Great Britain, particularly in Scotland; where it lodges in the fir-foreſts, building its neſt at the top of the trees.

The martin leaves ſo ſtrong a ſcent, that the hounds, when out in a morning, will often take it, and make a noble cry. The chace in this caſe is very good while it laſts, but it is very perplexed; for the creature is not able to run long, and when ſhe is tired, ſhe gets up into a tree; the hounds often loſe her on this occaſion; but if ſhe is ſpied up in the tree, ſhe is to be hunted down with ſticks, &c. When killed, the hounds are not ſuffered to eat her fleſh, for it is unwholeſome.

Martin, *Free*, is a name given in this country to a cow-calf, caſt at the ſame time with a bull-calf, which is a kind of hermaphrodite; that is never known to breed, nor to diſcover the leaſt inclination for the bull: nor does the bull ever take the leaſt notice of this animal. It has all the external marks of a cow-calf, *viz.* the teats, and the external female parts, called by farmers the bearing. When theſe animals are preſerved, it is not for propagation, but for all the purpoſes of an ox or ſpayed heifer, *viz.* to yoke with the oxen, and to fatten for the table. They are much larger than either the bull or the cow, and the horns grow larger, being very ſimilar to the horns of an ox. The bellow of the free martin is like that of an ox; and the meat reſembles that of the ox or ſpayed heifer; being generally finer than that of the bull or cow; and is more ſuſceptible of growing fat with good food. Mr. Hunter has anatomically deſcribed three animals of this kind, in the Phil. Tranſ. vol. lxix. part i. p. 289, &c.

Martin's, *St.*, *Cope*, in *Church Hiſtory*. See Cope.

MARTINAZZO, in *Ornithology*, the name of a ſpecies of water-fowl, of the larus or gull kind, the *larus nævius* of Linnæus, and called by the Dutch, the burgomaſter of Greenland; by the Corniſh people, the *waggell*, or the *great grey-gull*. See Larus *Nævius*.

MARTINDALE, Adam, in *Biography*, refuſing to conform to principles that he did not believe, was deprived of his living at Roſthorn in Cheſhire, in the year 1662, after which he acted as chaplain in the family of lord Delamere. He died about the year 1660, and is known as an author, by a uſeful tract on ſurveying, called the Land-meters Vade Mecum. He wrote likewiſe twelve problems on the ſubject of intereſt, and two almanacs. He kept a mathematical ſchool at Warrington, and afterwards at Dunham, in Cheſhire. In theology he was the author of "Divinity Knots unlooſed," and "Truth and Peace reſtored."

MARTINENGO, in *Geography*, a town of Italy, in the department of the Adda and Oglio; nine miles S. of Bergamo.

MARTINESL, a town of Tranſylvania; 16 miles S. of Millenbach.

MARTINET, in *Military Language*, denotes a ſtrict diſciplinarian, who, in matters of inferior moment, gives officers and ſoldiers needleſs trouble. Some ſay that the term is derived from an adjutant of that name, who was in high repute as a drill officer in the reign of Lewis XIV; but others deduce it from the French "Martinet," which is uſed to denominate a ſmall cat-o'-nine tails, fixed to the end of a wooden handle, with which ſchoolmaſters puniſh refractory or idle boys.

MARTINGALE, invented by Evangeliſta, an eminent horſeman of Milan, in the *Manege*, a thong of leather faſtened at one end to the girths under the belly of a horſe, and at the other end to the bitt, or, which is the better way, to a thin mouth-piece of its own, to hinder him from rearing, or toſſing up his head. It is alſo of ſervice when the horſe bears upon the hand, and his head is uncertain and inconſtant; when his jaws are too tight, and when he is ſtag-necked. If the ſnaffle is uſed with the reins faſtened low, it becomes a martingale, or anſwers the purpoſe better; becauſe the hand can make it ſtrict or eaſy, or both by turns, as the rider pleaſes, and the horſe requires.

MARTINHO, St., in *Geography*, a town of Portugal, in Eſtramadura, on the N. ſide of the Donao; 12 miles N.E. of Peniche.

Martinho *de Mouras*, *St.*, a town of Portugal, in the province of Beira; ſix miles N.W. of Lamego.

MARTINI, Martin, in *Biography*, a Jeſuit who reſided many years in China, concerning which country he wrote ſome curious memoirs. He returned to Europe in 1651, but probably viſited China a ſecond time, where he is thought to have died at about the age of 74; his principal works are "De Bello Tartaros inter et Chinenſes;" "Sinicæ Hiſtoriæ Decas prima a Gentis origine ad Chriſtum natum;" "China illuſtrata," being a geographical deſcription of that country illuſtrated by maps of each province: "A Relation of the Number and Quality of the Chriſtians in China." Moreri.

Martini, Fr. Giambatista, minor conventuale of the order of St. Francis, member of the Inſtitute and Philharmonic Society at Bologna. This worthy and learned father was well known all over Europe by the title of Padre Martini, and regarded, during the laſt fifty years of his life, as the moſt profound harmoniſt, and the beſt acquainted with the hiſtory and progreſs of the art and ſcience of muſic in Italy. All the great maſters of his time were ambitious of becoming his diſciples, and proud of his approbation. And young profeſſors within his reach never thought themſelves, or were thought by others ſufficiently ſkilled in counterpoint, till they had received leſſons from this deep theoriſt, and moſt intelligent and communicative inſtructor.

No hiſtory of muſic had been attempted in Italy, ſince that of Bontempi appeared in 1695, till Padre Martini, in 1757, publiſhed in 4to. the firſt volume of his "Storia Muſica," upon ſo large a ſcale, that though the chief part of his life ſeems to have been dedicated to it, only three volumes were publiſhed before his deceaſe in 1783.

The firſt volume of this elaborate work only contains 61 pages of hiſtory, which advance no further in the progreſs of the art, than what the ſacred writings have told us concerning its uſe and cultivation among the Hebrews, Chaldeans, and Egyptians. The reſt of the volume is filled with diſſertations. The firſt is an enquiry what kind of melody mankind is inclined to by nature, untaught by rules or example. Here the ancient Greek ſyſtems, tetrachords, ſcales, and genera are conſidered, and their numerical proportions given. Much muſical erudition is manifeſted in this diſſertation concerning the muſic of the ancients.

Diſſertation II. On what kind of conſonance was uſed by the ancients, or, in other words, whether they had ſimultaneous harmony, or that kind of *harmony*, or muſic in parts, which the moderns call *counterpoint*. This ſubject is well diſcuſſed, the opinions pro and contra fairly given, with ſpecimens of early attempts at harmony, and progreſſive improvements in counterpoint from the time of Guido. Infinite pains have been taken in this profound enquiry. No writer was ever more timid in aſſertion than the worthy Padre Martini. Not a ſentiment has eſcaped him on the authority of his own opinion or conjecture, all is confirmed by the moſt curious ſpecimens and citations from the moſt ancient and reſpectable writers on the ſubject.

Diſſertation III. Of the melody and muſical inſtruments uſed by the Hebrews in the Temple. The ſacred writings and the fathers have been ſtudiouſly conſulted and quoted in this inquiry, as well as Rabins, and the ſervice of the ſynagogues, whence ſeveral Hebrew chants have been drawn, as well as from the Pſalmody of the firſt reformers, and the canto-fermo of the Miſſal.

This volume, beſides plates of ancient inſtruments, and muſical examples printed with types, has head and tail-pieces in the form of vignettes to each chapter and diſſertation, on which are engraved canons by the author in every kind of conſtruction; which being only given in a ſingle part, without bars, and often wrapt up in myſtery, their ſolution will be an excellent ſtudy for Tyros in the art of compoſition.

"Storia della Muſica," tomo ſecondo da F. Giambatiſta Martini, in Bologna, 1770, 4to. Though thirteen years had elapſed between the publication of the firſt volume and this, the learned and laborious author has advanced but a little way in the hiſtory even of ancient muſic. The firſt volume adheres more cloſely to the ſubject of his hiſtory than this, which is more miſcellaneous. Chronologically, the author advances no further in this volume, which is wholly confined to Greek muſic, than the inſtitution of the Olympic games. So that the period which he deſcribes is limited to fabulous times. Indeed he deſcribes the cuſtoms, manners, and uſes to which muſic was applied by the moſt ancient inhabitants of Greece, more than the muſic itſelf, of which there are no remains to give evidence to the wonderful powers aſcribed to it He has a chapter on the origin of muſic in Greece, chiefly on the word of the poets; and another chapter on the univerſal uſe of muſic among that refined people. In this volume we have, likewiſe, learned diſſertations; one on the ſingular qualities aſcribed to muſic by the Greeks; and another on the reſpect which they had for this art, and the wonderful effects ſaid to have been produced by it.

In this volume, beſides a number of learned and elaborate canons, placed in a ſimilar manner to thoſe of the firſt volume, we have a map of ancient Greece and Aſia Minor; and in the preface a ſketch of the hiſtory of the early inhabitants of thoſe countries, who firſt cultivated the fine arts.

"Storia della Muſica," tomo terzo da F. Giambatiſta Martini, in Bologna, 1781, 4to.

It is much to be lamented that this was the laſt volume of his elaborate work, which the learned author lived to publiſh! It is the more to be lamented, as this indefatigable eccleſiaſtic had, with incredible pains and conſiderable expence, collected materials ſufficient for the completion of his whole plan. And this third volume advances no further in the hiſtory of ancient muſic, than the period between the eſtabliſhment of the Olympic games of Greece to the time of Alexander the Great. The hiſtory of Roman muſic only was to have occupied the fourth volume. From the materials of which P. Martini was in poſſeſſion, there is reaſon to believe that the hiſtory of muſic in Italy, where the preſent ſyſtem throughout Europe had its riſe during the middle ages, and from the time of Guido to the preſent period, would have been the moſt valuable preſent to all Europe which the good father could make; but in writing the hiſtory of ancient Greece and Roman muſic, he had no other means of information than thoſe of which others were in poſſeſſion; the claſſical writers and their commentators. Of theſe, indeed, P. Martini has availed himſelf, it will perhaps be ſaid, to an exceſſive degree. In the volume now before us, we have a long preface, and canons, as before. And beſides the hiſtory of muſic from the firſt Olympiad, we have the hiſtory of every ſpecies of poetry that was connected with muſic, with the hiſtory of its profeſſors, as well as of the ſtage, tragic and comic, and of all the poets and philoſophers who cultivated muſic, and wrote upon the ſubject. The volume is terminated with another diſſertation on the miraculous effects aſcribed to the muſic of the ancient Greeks, with new facts and reaſoning. This volume will probably be thought tedious by thoſe who have read, or are able to read, the original authors whence its materials are derived; to others it is a valuable Theſaurus of all that can be extracted concerning muſic, from the chief writers of high antiquity and authority, that are come down to the preſent times.

It is but juſtice to extend the account of this important work beyond the general limits of the ſhort analyſis given of other literary muſical articles. The ſtyle has been ſaid to be dry and prolix. It is indeed enlivened by no extraneous matter, or ingenious reflections; but each page is replete with information on the ſubject in queſtion: and the notes abound in curious paſſages from ſcarce books. The road through which the good father leads us, if not ſtrewed with flowers, is not barren, but frequently affords a glimpſe, at leaſt, of incipient cultivation, which excites a wiſh and eagerneſs to advance out of twilight, into regions where the ſun of ſcience ſhines with more luſtre, to which, alas! the author did not live to lead us.

Between the publication of the ſecond and third volumes of his "Storia Muſica," P. Martini publiſhed a work, entitled "Eſſemplare o ſia Saggio di Contrappunto," Bologna, two volumes, folio, 1774.

This excellent treatiſe, though written in defence of a method of compoſing for the church upon canto-fermo, now on the decline, yet has given the learned author an opportunity of writing its hiſtory, explaining its rules, defending the practice, and of inſerting ſuch a number of venerable compoſitions for the church by the greateſt maſters of choral harmony in Italy, from the beginning of the ſixteenth century to the middle of the laſt, that we know of no book ſo full of information concerning learned counterpoint, ſo rich in ancient and ſcarce compoſitions, nor ſo abundant in inſtructive and critical remarks, as this.

The work is divided into two parts or volumes. In the firſt, after a candid and fair explanation of his deſign, and a wiſh to keep ſacred muſic ſeparate from ſecular, we have "a ſhort compendium of the elements and rules of counterpoint." The laws of harmony are here compriſed in ten rules, which are extremely well explained and illuſtrated. We

We then have a fundamental and practical eſſay on counterpoint conſtructed upon canto-fermo. This is followed by upwards of ſixty admirable compoſitions in all the eccleſiaſtical tones by the greateſt maſters of the old ſchool of counterpoint in Italy; ſuch as Animuccia, Cifra, Morales, Paleſtrina, Pontio, Porta, Willaert, his ſcholar Zarlino, and others.

The ſecond part contains examples of compoſition, or a fundamental and practical eſſay on *contrappunto fugato*, implying the art of fugue. Here all the terms of this art are explained; as ſubject, anſwer, point, regular fugue, and imitation. Canon is defined, and indications and ſigns are given for the commencement of the ſeveral parts in Italian, Latin, and Greek, with explanations of other technica placed at the beginning of canons, where *ſeveral parts are to be.*

There are prefixed to many ancient canons, certain mottoes and enigmas of very difficult ſolution. The author has collected and explained a ſeries of theſe. Other technical terms occur, ſuch as *propoſta*, *riſpoſta*, *antecedente*, *conſequente*, *contraſoggetto*, *roveſcia*, &c. All theſe rules and terms are illuſtrated with examples of compoſition by P. Martini himſelf. After which we have near fifty compoſitions in fugue and canon of the moſt curious kind, from the works of Paleſtrina, Agoſtini, Benevoli, Bernabei, Luca Marenzio, Monteverde, Clari, Lotti, Marcello, Perti, Stradella, Steffani, Aleſſandro Scarlatti, &c. in 2, 3, 4, 5, 6, 7, and 8 parts.

The compoſitions of theſe maſters are not more admirable than the hiſtorical and critical notes of the editor, which young ſtudents will find no leſs inſtructive than amuſing.

In 1769 Padre Martini drew up and gave to his diſciples a very ſhort tract, entitled "Compendio della Theoria de numeri per Uſo del Muſico di F. Giambatiſta Martini. Minor Conventuale." In this tract, the good father defines the three principal calculations, ratios, and proportions neceſſary for a muſician to know in the diviſion of the monochord and in temperament:

The *arithmetical progreſſion*, in which the intervals are equidiſtant.

The *geometrical progreſſion*, or ſeries of numbers in a duplicate ratio.

The *harmonical progreſſion*, conſiſting of a ſeries of numbers.

See Progression and Proportion, where the Engliſh reader will find the ſeveral progreſſions and proportions uſed in harmonics more clearly explained than in this ſmall tract of Padre Martini, in Italian, or even in a tranſlation of it.

But Padre Martini was attacked in a more rude and formidable manner by Eximeno, in a publication ſubſequent to his treatiſe "Dell' origine e delle Rigole della Muſica," in a publication under the title of "Dubbio di D. Antonio Eximeno ſopra il Saggio di Contrappunto del Giambattiſta Martini," printed at Rome 1775. In this work, as a defence of his own flimſy ſyſtem, he tries to overturn all other ſyſtems, particularly that which Padre Martini is endeavouring to explain and defend in his "Saggio di Contrappunto." It is the method of teaching counterpoint by writing upon *canto fermo*, which has been eſtabliſhed in the conſervatories of Naples more than a hundred years. And when we recollect the great compoſers, not only of church-muſic, but theatrical, which the Neapolitan ſchool has produced, we cannot help regarding its method with reverence, particularly as far as regards eccleſiaſtical compoſition, alla Paleſtrina, which is that of our ſervices and full anthems on the venerable models of Tallis and Bird; nor can that reverence be diminiſhed by the writings of any of its foes, till a better method is diſcovered, which has not yet been done by ſignior Eximeno; who is a lively writer, an able logician, and ſeemingly better ſkilled in every other art and ſcience than that of muſic, if we may be allowed to judge by the ſpecimens which he has given in illuſtration of his own rules of compoſition, which were intended to ſuperſede all former laws of harmony throughout Europe.

The Neapolitans, whoſe ſchool and method of teaching counterpoint by writing upon canto fermo P. Martini had ſo well defended in his "Saggio di Contrappunto," publiſhed, without name or date, a pamphlet entitled "Giudicio di Apollo." A certain Andrea Manini, of Udini, having, in a work entitled "Trattato in Genere Teorico," publiſhed in 1761, treated with diſreſpect, not only P. Martini, but his excellent maſter, Jacopo Perti; all the venerable harmoniſts of the 16th and 17th centuries appear before Apollo in defence of the perſons traduced; and Manini, the author of that libel, is ſentenced, not only to perpetual baniſhment from Parnaſſus, and from all intercourſe with the muſes and their votaries, but prohibited, in future, from all further uſe of his pen. This pamphlet iſſued from the Neapolitan preſs, was circulated all over Italy, no body knew by whom or by what means.

Martini, Giuseppe san, an exquiſite performer on the hautbois, and an original and excellent compoſer, was a native of Milan; but beſt known in England by the title of Martini of London, where he arrived in 1723. His firſt public performance there was at a benefit concert, at the little theatre in the Hay-market, then called the French theatre, from a company of French comedians being allowed to act plays there in the French language, to which George I. frequently went, as his majeſty was not ſufficiently acquainted with our language to be much amuſed at our national theatres. The benefit concert at which Martini was firſt heard, was for a ſignior Piero; in the advertiſement for which, Martini is called "an Italian maſter, juſt arrived." But in this performance the applauſe he received was ſuch, that he was immediately engaged as principal hautbois at the Royal Academy of Muſic, or Opera, where he continued to perform during the whole time of Handel's regency.

His firſt publication in England was advertiſed October 6, 1730; conſiſting of "Twelve ſonatas for two flutes and a baſe, *being exceeding fine harmony*." Such previous praiſe is ſeldom given to compoſitions that deſerve it; but the public ſoon found that a newſpaper eulogium, for once, ſpoke the truth.

About the year 1740, he was taken into the ſervice of his royal highneſs Frederic prince of Wales, was muſic-maſter to the princeſſes, and gave leſſons in ſinging to ſeveral ladies, who had the good taſte to be ſenſible of his merit, and the good fortune to prevail on him to attend them; but he performed no more in public after he quitted the opera.

We never heard him play; but the concertos which Tommy Vincent, his ſcholar, uſed to perform on the hautbois, and which he had compoſed for himſelf, were admirable; full of fire, and new and elegant paſſages, in the true genius of the inſtrument; and the beſt judges who had often heard him at the opera and in private parties, would allow of no parallel in his tone and execution, with thoſe of any other hautbois player upon earth.

He died about the year 1750. And as a proof of the high admiration with which the public was impreſſed by his performance, when his books and inſtruments were ſold by auction after his deceaſe, a hautbois on which he uſed to

perform,

perform, which originally only coſt five-and-twenty ſhillings, ſold for eighteen guineas, to ſomebody, who perhaps imagined, that an inſtrument on which Martini uſed to play ſo delightfully, would almoſt play itſelf.

As a compoſer, Martini was poſſeſſed of all the learning of the old ſchool, with infinitely more invention, taſte, and grace than any other Italian of his time.

His twelve ſonatas for two violins and a baſe, dedicated to the princeſs of Wales, were very long in high favour with the public; and his full concertos, when performed at the concert of ancient muſic, ſtill excite the attention and admiration of all true judges of inſtrumental muſic. Indeed San Martini was the only compoſer of whoſe productions the excluſive admirers of Corelli, Geminiani, and Handel ever ſpoke without the ſarcaſtic epithet of *new*, or the more broad cenſure of *modern flimſy ſtuff*. But Martini ſtill wrote fugues; in ſpite of which his muſic ſtood its ground among the moderns, better than any other inſtrumental compoſitions with which we are acquainted.

Martini, Giovanni Batista san, a younger brother of San Martini of London, in 1770, was organiſt and maeſtro di cappella to ſo many churches at Milan, and wrote ſo faſt, that his eccleſiaſtical compoſitions were too ſlight and flimſy. The late viſcount Dudley and Ward, when on his travels, took leſſons of him in muſic, and his lordſhip, then the honourable Mr. Ward, having collected all the curious compoſitions of the time, in his progreſs through Italy, Martini eagerly borrowed of his elève all the new muſic which he could poſſibly ſpare, and honeſtly confeſſed that it was with a view to feed his own fancy, which, by writing ſo much and ſo faſt, was a little exhauſted. There was ſcarcely a clown in Italy who did not know good muſic from bad. And we ourſelves, on a day of feſtival, in a church, heard two peaſants, after liſtening a little while to one of Martini's maſſes, cry out, "Quita muſica è ſcelerata-audire," and haſtened away to another church.

The violin muſic, however, of this Martini, particularly his ſymphonies, concertos, and notturni, compoſed about the middle of the laſt century, was full of fire, invention, and beautiful melodies. He was one of Giardini's maſters on the violin; and the firſt piece he played in public, after his arrival in England, was a ſolo at the benefit of Cuzzoni, compoſed by San Martini of Milan.

Some of his ſymphonies and full pieces were played at Vauxhall, Ranelagh, Mary-bone, and Cuper's gardens, with great applauſe, during many years.

Martini, *Abate*, a learned Venetian dilettante, and an excellent judge of every ſpecies of muſic, ancient and modern; was an able mathematician, compoſer, and performer. He had travelled into Greece, in order to make obſervations in geography, agriculture, and natural hiſtory, but being unable to ſatiſfy himſelf as he expected, his pride was ſo hurt by the diſappointment, that he would not publiſh any of his remarks or diſcoveries. Among other curious enquiries, he made many concerning the muſic of the modern Greeks, in hopes it would throw ſome light upon that of the ancient. He knew as much, we believe, as any one elſe, about the ſyſtems of Pythagoras, Ptolemy, and the Greek writers collected by Meibomius, as well as of Rameau and Tartini. He was a great admirer of the works of Marcello, and ſung, by heart, all his cantatas and beſt melodies; and was the founder of an academy for the performance of his muſic, excluſively.

When he viſited the Greek iſles, beſides enquiries after ancient muſic, his curioſity extended to the preſent ſtate of muſic among the modern Greeks, of which we have ſpoken elſewhere. See Music *of the Greek Church*, and *Ruſſian* Music.

Martini *of Madrid*, a lively and ſpirited compoſer, who has furniſhed the theatre Italien, at Paris, with the muſic of ſeveral ſucceſsful comic operas. We are not much acquainted with the vocal muſic of this author; but have ſometimes thought his inſtrumental too turbulent and clamorous.

Martini, in *Geography*, a town of Naples, in the province of Otranto; 16 miles W. of Oſtuni.

MARTINICO, one of the largeſt of the Caribbee iſlands in the Weſt Indies, being about 60 miles in length, and 30 in breadth, and containing about 260 ſquare miles. The interior part is hilly, abounding with hillocks or ſmall eminences, above which are elevated three mountains of conſiderable height. The higheſt of theſe, called Pelée, exhibits appearances of an extinct volcano, and is covered with woods that attract the clouds, and occaſion noxious damps, which render it in a great meaſure inacceſſible. The other two mountains are in moſt parts cultivated. Theſe mountains, and particularly the firſt, furniſh ſprings, from which iſſue the ſtreams that water the iſland: theſe are naturally of gentle current, but, with the ſlighteſt ſtorm, are changed into torrents. The chief river is called Galion, and waters the N.E. part of the iſland. The water which they ſupply, partaking of the nature of the ſoil over which they paſs, is in ſome caſes excellent, and in others ſo bad, that the inhabitants are under a neceſſity of drinking the water which they have collected in the rainy ſeaſon. The produce of the ſoil, fertilized by its rivers, is ſugar, cotton, indigo, cocoa, ginger, and ſuch other commodities as are found in the neighbouring iſlands; and as its bays and harbours are numerous, ſafe, commodious, and well fortified, it is favourably adapted for trade. The iſland is divided into twenty-eight pariſhes, which contain about the ſame number of towns and villages, and two principal towns, *viz.* Fort Royal and St. Pierre. The firſt Europeans, who formed a ſettlement in this iſland, were the French, under the conduct of M Deſnambuc, accompanied by about 100 perſons from St. Chriſtopher's in the year 1635: and after having obtained land from the Caribbs, they at length expelled the natives. The French being thus maſters of the iſland, and living without moleſtation, reſtricted themſelves for ſome time to the cultivation of cotton, ſoon adding that of annotto and indigo. About the year 1650, they commenced the culture of ſugar; and ten years afterwards, Benjamin Da Coſta planted ſome cocoa-trees. His example was followed in 1684, when the demand for chocolate in France became more common. Cocoa continued for ſome time to be the principal object of cultivation till the year 1718, when all the cocoa-trees were deſtroyed. The coffee-tree was then introduced, as a kind of ſuccedaneum to the cocoa which had failed. Martinico promiſed great advantages to the French; and accordingly it was made the ſeat of their government, and the object of their particular attention. Nevertheleſs, at the end of the 17th century, its progreſs had not been very conſiderable. In 1700, the whole population, reckoning white men, free negroes, and ſlaves, amounted to no more than 21,640 perſons. The cattle conſiſted of 3668 horſes or mules, and 9217 head of horned cattle. The inhabitants cultivated a great quantity of cocoa, tobacco, and cotton; they had nine indigo houſes, and 183 ſmall ſugar plantations. In 1736, there were 447 ſugar-works; 11,953,232 coffee-trees; 193,870 of cocoa; 2,068,480 of cotton; 39,400 of tobacco; and 6750 of annotto. The population amounted to 72,000 blacks, men, women, and children; and their ſupplies for proviſion conſiſted fifted of banana-trees, caffava, potatoes, and yams. At this time the annual exportation amounted to 700,000*l.* fterling. The export trade was very extenfive. However, the war of 1744 checked this profperity. By a feries of misfortunes and loffes, Martinico fell into the hands of the Englifh in 1762; but in the following year, at the conclufion of the war, it was reftored to its original proprietors. In the year 1770, this ifland contained 11,588 white people; 2524 free people of colour; 71,142 flaves. It was then thought that the flaves were too few for the cultivation, which was chiefly that of fugar-canes; with fome cacao, indigo, cotton, and coffee. The noted fnuff, called "Macouba," is made of tobacco raifed in the parifh of that name in the north of Martinico. About this time its products were computed at 23,000,000lbs. of fugar, 3,000,000lbs. of coffee, 600,000lbs. of cotton, and 40,000lbs. of cocoa. In the ftatiftical account of France, publifhed by Herbin, the population of Martinico in 1788 is faid to confift of 10,603 whites, 4851 free mulattoes, and 73,416 flaves. The exports at that time amounted to 25,640,000 francs; while the imports from France amounted to 15,133,000 francs of French produce, and 9,198,000 francs of foreign trade. Martinico is celebrated for a diftillery of liquors. Quarries of free-ftone are rare in this ifland, and blocks of lava are ufed. Lime is made with the madrepores and fea-fhells. No mines have been difcovered; but a ferruginous fand, after a volcanic production, had been obferved on the fhore near mount Pelée. The inhabitants of Martinico are pale, and deftitute of that bloom which is obfervable in the people of France. Moft of the native quadrupeds have been deftroyed; but rats and mice unhappily abound. In this ifland there is a bird called the whiftler of the mountain, from the refemblance of his cry to that of a man whiftling. The red ant was very deftructive till it was deftroyed by putting arfenic into its nefts, or ftrewing it over its path. The hurricanes in Martinico are very violent and deftructive. The rain defcends in large drops refembling the found of hail. In the year 1794, Martinico was taken by the Britifh under the command of fir John Jervis and fir Charles Grey; the attack commenced Feb. 3, and the ifland furrendered March 16. N. lat. 14° 24′ to 14° 52′. W. long. 61° 2′ to 61° 26′.

Martinico, *Little*, one of the Grenadine iflands in the Weft Indies. N. lat. 13° 38′. W. long. 61° 18′. See Bekia.

MARTINIUS, Matthias, in *Biography*, a learned German Proteftant divine and philologift, was born in the county of Waldec in the year 1572. He was educated under the celebrated Pifcator. When he had attained the age of twenty-three, he was appointed preacher to the court of Naffau-Dillembourg, and in 1596 he was nominated one of the profeffors of the college of Herborn. He particularly excelled in his philological lectures, and in initiating his pupils in the oriental languages. About the year 1607 or 8, he became paftor of Embden, where he remained three years, much refpected and efteemed as a minifter and a man. He was now offered the rectorfhip of the college of Bremen, which he accepted, to the great benefit of that inftitution. In 1618, Martinius was one of the deputies appointed by the city of Bremen to the fynod of Dort, where he enlifted among the combatants againft the fupralapfarians. He died at the age of 58, in the year 1630. His works are very numerous; but the moft important, and that on which his fame is chiefly built, is "Lexicon Philologicum, præcipue Etymologicum et Sacrum," in two large volumes, folio. Moreri.

MARTINO, St., in *Geography*, a town of Italy, in the department of the Adda and Oglio; 8 miles W. of Bergamo.—Alfo, a town of France, in the department of the Po, in the diftrict of the Four Vallies, to which it gives name; 9 miles N.W. of Pinerola.—Alfo, a town of France, in the department of the Sefia; 19 miles N. of Turin.—Alfo, a town of France, in the department of the Dora, near the Dora Baltea; 17 miles S.E. of Aofta.—Alfo, a town of France, in the department of the Maritime Alps; 12 miles W. of Tenda.—Alfo, a town of Italy, in the Veronefe; 15 miles N.W. of Verona.—Alfo, a town of Italy, in the department of the Reno; 12 miles N.E. of Bologna.—Alfo, a town of Italy, 13 miles N. of Modena.—Alfo, a town of Naples, in Calabria Ultra; 5 miles N.W. of Oppido.—Alfo, a town of Naples, in Bafilicata; 24 miles S.S.E. of Potenza.—Alfo, a town of Corfica; 4 miles N. of Baftia.—Alfo, a town of Italy, in Friuli; 7 miles S.E. of Friuli.

Martino *Pefcatore*, in *Ichthyology*, a name given by Salvian, and fome others, to the rana pifcatrix of authors, the lophius of Artedi.

MARTINOWA, in *Geography*, a town of Auftrian Poland; 6 miles N. of Halicz.

MARTINSBERG, St., a town of Hungary; 10 miles S.E. of Raab.

MARTINSBOROUGH, a town of America, in North Carolina, on the S. fide of Tar river; 20 miles above Wafhington.

MARTINSBURG, a poft-town of Virginia, and capital of Berkley county, about 8 miles S. of the Patowmac, in the midft of a fertile and well cultivated country; 25 miles from the mineral fprings at Bath. It contains more than 70 houfes, a court-houfe, gaol, and epifcopal church, and another near the town is appropriated to the Prefbyterians; 22 miles N.E. of Winchefter, and 88 N.N.W. of Alexandria.

MARTINSDYCK, St., a town of Holland, in the ifland of Tolen; 5 miles W. of Tolen.

MARTINSPERG, a town of Auftria; 6 miles S.S.W. of Zwetl.

MARTINVAST, a town of France, in the department of the Channel; 3 miles S. of Cherbourg.

MARTINVILLE, a poft-town of America, and the capital of Guilford county, in North Carolina, pleafantly fituated on the E. fide of Buffaloe creek, and containing about 40 houfes, a court-houfe, and gaol.

MARTIOBARBULI, among the *Romans*, a defignation given to foldiers who carried leaden balls to annoy the enemy with.

MARTIORA, or Marticora, in *Natural Hiftory*, the name which the ancient Greeks gave to the animal which the Romans called *mantichora*.

MARTIZAY, in *Geography*, a town of France, in the department of the Indre; 11 miles S. of Chatillon fur Indre.

MARTLET, in *Heraldry*, a little bird reprefented without feet, and properly alfo without a beak.

It is ufed as a difference, or mark of diftinction, of a younger brother; fome fay, more peculiarly of the fourth brother, or family. See Differences.

MARTNETS, in a *Ship*, fmall lines faftened to the leetch of a fail, being reeved through a block on the topmaft-head, and coming down by the maft to the deck. Thofe martnets which belong to the top-fails are faftened after the fame way to the heads of the top-gallant-mafts, but their fall comes down no farther than the top, when it is haled. The word is, *top the martnets*, *i. e.* hale them up. Their defign is, in furling the fail, to bring that part of the leetch

leetch which is next the yard-arm clofe to the yard, fo that the fail may furl up the clofer.

MARTO, in *Geography*, a town of European Turkey, in Romania; 20 miles S.S.W. of Gallipoli.

MARTOCK, a market town and parifh in the hundred of that name, and county of Somerfet, England. It chiefly deferves notice on account of its church, which is a large and elegant edifice, confifting of a nave, chancel, north and fouth aifles, and a porch. The interior is finely ornamented with carved work, and fome paintings of the apoftles. An altar-piece in ftucco, erected by John Butler, efq. particularly attracts admiration. The market is held twice a week, on Wednefday and Saturday, and is ufually well fupplied with provifions of every defcription. Near the market-houfe, which is a neat modern building, erected at the junction of three turnpike roads, in the middle of the town, ftands a very handfome fluted column, being a model of the famous pillar of Trajan. The parifh is of great extent, and is divided into nine tythings, containing, according to the parliamentary returns of the year 1801, 376 houfes, occupied by 2102 perfons. The town is watered on the fouth-weft by the river Parret, and on the north by the Yeo. The manor was poffeffed by Edith, queen of Edward the Confeffor, at the time of the Norman conqueft. The Hiftory of Somerfetfhire, 3 vols. 4to. 1791.

MARTON, St., a town of Hungary; 10 miles W. of Rofenburg.

MARTORANO, a town of Naples, in Calabria Citra, the fee of a bifhop, fuffragan of Cofenza; 13 miles S. of Cofenza. N. lat. 30° 8′. E. long. 16° 28′.

MARTOREL, a town of Spain, in Catalonia, fituated on the Noya, at its confluence with the Llobregal. This is a fmall, dirty, clofe, and ill-built town; it has a parifh church, a convent of monks, and fome barracks; the inhabitants are laborious; the women make lace and blonds. Near this town is a triumphal arch, faid to have been erected by Hannibal in honour of his father; fituated at the north end of a bridge originally built by his order when he croffed the river in his way to Italy, and repaired in 1768; 20 miles N.W. of Barcelona.

MARTORY, St., a town of France, in the department of the Upper Garonne, on the Garonne; 10 miles N.E. of St Gaudens.

MARTOS, a town of Spain, in the province of Jaen, fuppofed to be the ancient *Tucci*, afterwards called *Augufta gemella*; fituated on the fide of a lofty mountain, on the top of which is a caftle. The town belongs to the order of Calatrava, by which a civil and military governor are kept there, and an alcade mayor for the adminiftration of juftice. It was once an epifcopal fee, which was deftroyed under the Moors. Its prefent population amounts to 15,000 perfons. The top of the rock on which the caftle ftands is famous for the death of the two brothers of Carvejal, commanders of the order of Calatrava, who under an unfounded charge of murder were precipitated from the rock by order of Ferdinand, king of Caftile; 10 miles W. of Jaen.

MARTRAGNY, a town of France, in the department of the Calvados; nine miles N N.W. of Caen.

MARTRES, a town of France, in the department of the Upper Garonne; 15 miles N.E. of St. Gaudens.

MARTRES *de Veyre, Les*, a town of France, in the department of the Puy de Dôme; feven miles S.S.E. of Clermont.

MARTYN, JOHN, in *Biography*, late profeffor of botany at Cambridge, was born Sept. 12. 1699, in Queen ftreet, London, where his father Thomas, a very worthy and refpectable man, lived in a mercantile ftation. His mother, whofe maiden name was Catharine Weedon, died Nov. 1, 1700. After being educated at a private fchool in the neighbourhood, he was taken, at the age of 16, into the compting-houfe of his father; nor does it appear that he neglected or defpifed the duties of the ftation to which he was then deftined, though he had already imbibed fo ftrong a tafte for literature, that he conftantly devoted much of the night to ftudy, allowing himfelf, for many years, no more than four of the 24 hours for fleep. In the fummer of 1718 he firft acquired a tafte for botany, in confequence of his acquaintance with Mr. Wilmer, an apothecary, who afterwards became demonftrator in the Chelfea Garden. He was in the following year introduced to Dr. Patric Blair, and the juftly celebrated Dr. William Sherard, the moft liberal and intelligent promoter of this fcience that his country could then boaft. With fuch inftructors and counfellors, his progrefs was rapid. He foon became defirous of commencing author, and it is fortunate that this was not prevented, by his imbibing the diffidence of Sherard along with a portion of his knowledge. Mr. Martyn tranflated Tournefort's hiftory of the plants growing about Paris, from the French into Englifh, in 1720; which however he did not print till twelve years afterwards, when it appeared, dedicated to lord Petre, and improved in many refpects, being accommodated to this country by the addition of Englifh names, and the mention of particular places of growth. Nor were his ftudies merely fpeculative, or confined to books. He undertook various botanical excurfions, which were chiefly performed on foot, that he might obferve plants in their natural fituations, as well as infects, which had now likewife excited his attention. When at home, he bufied himfelf in fowing feeds, that he might fpeculate upon their germination, and the ftructure of their cotyledons, and was eager in collecting, not only dried fpecimens of plants, but their feeds and fruits. His attention to thefe fubjects, prove him to have been no fuperficial enquirer, and his letters to Blair fhew that he ftudied both nature and Cæfalpinus with advantage. The leading character of his mind feems to have been a tafte for enquiry, which prompted him to examine every thing for himfelf. His obfervation of the works of God directed his thoughts to the divine origin of all things, and his perufal of fome of the moft famous adverfaries of revealed religion, ferved but to confirm him in its truth. About the year 1721 he became acquainted with the celebrated Dillenius, and in conjunction with him and feveral others, amongft whom we find the names of Deering, Thomas Dale, and Philip Miller, eftablifhed a botanical fociety, which met every Saturday evening. Dillenius was prefident, and Martyn fecretary. The latter, ever foremoft in activity, read before this fociety a courfe of lectures, upon the technical terms of the fcience, the foundation, as it is prefumed, of what he afterwards publifhed. Thefe meetings were continued for about five years only.

We are not informed of the period at which Mr. Martyn changed his mercantile occupation for the medical profeffion, to which he was, doubtlefs, led by the general tenour of his purfuits. In 1723 he was offered admiffion into the Royal Society, which he declined, as it appears by one of his letters to Dr. Blair, from pure modefty. His objections however were overcome the next year; and he foon proved himfelf an active and worthy member, by his various communications, to be found in the Tranfactions of that learned body; of which publication he fubfequently took a part in the abridgment, though he was an unfuccefsful candidate for the place of Secretary to the fociety, obtained by Dr. Cromwell Mortimer. In 1726 he publifhed his tables of Officinal Plants, in 20 pages folio,

folio, difpofed according to Ray's fyftem.' He had given a public courfe of lectures in Botany the preceding year, and had, with the affiftance of Dr. Blair, undertaken to make a collection of birds. His herborizing excurfions were from time to time continued, notwithftanding his various labours and engagements in town. His fecond courfe of lectures there, in 1726, being much approved, he was recommended by Dr. Sherard and fir Hans Sloane as fit to teach the fcience in which he excelled, to the Univerfity of Cambridge. He gave, in 1727, in the anatomy fchools, the firft botanical courfe ever read in that Univerfity, though Ray had ftudied there, and done all that he could to excite a love of natural knowledge. For the ufe of his pupils he reduced the alphabetical catalogue of Cambridge Plants, printed by that great man, into a fyftematic form, according to the principles of its author. As he excelled in the knowledge of Cryptogamous vegetables, he improved the work in that department; and he now very judicioufly laid afide the old fyftematic practice, of feparating trees and fhrubs from herbs, in his claffification. When we confider what Mr. Martyn meditated, and what he accomplifhed, in the technical and fyftematic departments of Botany, he will be found to deferve a high rank amongft the philofophers, even of the age in which he lived; nor did he leave any walk of his beloved fcience unexplored. In 1728 he publifhed the firft Decade of a fumptuous work, entitled *Hiftoria Plantarum Rariorum*, in imperial folio, in which his merit in the defcriptive line is confpicuous. The plates were drawn by that great artift Van Huyfum, engraved in mezzotinto by Kirkall, and printed in colours. In the latter part of their execution they fail very much, that mode of colouring plates having fcarcely ever been found to anfwer, though at prefent carried in France to a higher degree of perfection than heretofore. (See FIGURES *of Plants.*) Four more Decades of this work appeared in the courfe of nine years, after which it ceafed, on account of the great expence of the undertaking.

When this publication commenced, its author is faid to have "fedulouſly applied himfelf to the practice of phyfic." We prefume this muft have been as an apothecary, for he was not, by any medical degree, authorized to practife as a phyfician.

In 1729 he had a defign of reading botanical lectures at Oxford, and it is not known what prevented this fcheme. Probably the recent eftablifhment of the Sherardian profefforfhip there, in favour of his friend Dillenius, might very juftly deter Mr. Martyn from what could not but feem an unneceffary, if not an unfair, intrufion.

In the following year we find him projecting, in conjunction with Dr. Ruffel, the Herculean labour of a new edition of Stephens's Latin *Thefaurus;* but this defign was dropped. Inftead of it, he affociated himfelf with the fame friend, and fome others, in a critical work, entitled the Grub-ftreet Journal, a periodical publication, which had a large fale. In what ftyle or temper it was executed we have not had an opportunity to inquire; but the critical differtations of our author, publifhed by his fon, difplay his critical learning and acutenefs in no ordinary degree.

On the 26th of May, 1730, Mr. Martyn was admitted of Emanuel College, Cambridge, with an intention of taking his degrees in phyfic; but after keeping five terms, his marriage, and the neceffary attendance to his profeffion, caufed him to relinquifh this defign. He had refided for three years in Great St. Helen's, but the town air difagreeing with his conftitution, which was afthmatic, he removed to Chelfea, where he married, on the 20th of Auguft 1732, Eulalia, youngeft daughter of John King, D.D. rector of Chelfea and prebendary of York, by whom he had three fons and five daughters. Four of the latter died young, but the other children furvived him.

At the clofe of this year the Profefforfhip of Botany at Cambridge became vacant, by the death of Mr. Bradley, who had for fome years, not very worthily, filled it. All eyes were directed towards Mr. Martyn as the propereft perfon for this fituation, and his opponents, who wifhed to obtain it for themfelves or their friends, confcious of his fuperior merit, had no other refource than to reprefent him as a Nonjuror. Whatever effect this might have had was defeated, by his taking the requifite oaths, and his unanimous election took place on the 8th of February 1733. It is remarkable that in two or three years after obtaining the appointment, he finally ceafed to lecture. This is attributed to the want of encouragement, and efpecially of a botanic garden, at Cambridge. There had been hopes of the latter being eftablifhed in 1731, through the liberality and zeal of a Mr. Brownell of Willingham; but the fcheme fell to the ground, nor was it revived with effect till many years afterwards.

Neverthelefs, our indefatigable botanift and fcholar was not idle. The work on which his literary fame chiefly and firmly refts is his fplendid quarto edition of Virgil's Georgics, which appeared in 1741, dedicated to Dr. Mead. Here his abilities and his acquifitions had their full fcope. The text was accompanied by an Englifh tranflation, and ample notes in the fame language. In thefe the editor was enabled, by his peculiar line of ftudy, to throw more light upon the natural hiftory of his author, than any one before him had done, nor is it eafy to improve upon his performance. He was affifted in the aftronomical part by his friend the celebrated Halley, to whofe worth he has given a juft and feeling tribute in the preface. In 1749 he publifhed the Bucolics on the fame plan, and intended to have gone through the whole of the Roman poet; but growing infirmities, and the lofs of his wife, who died of a cancer in the breaft this year, for a while damped his ardour. The labours of his profeffion, too, were becoming burthenfome. He fpeedily indeed repaired his domeftic lofs, marrying, in July 1750, Mary Anne, daughter of Claude Fonnereau, Efq. of London, merchant. This lady bore him one fon, and furvived him.

In the fpring of the year 1752 he retired from practice, and devoted himfelf to that rural feclufion, which his acquirements were fo well calculated to render both profitable and delightful. He took a farm in a moft beautiful fituation at Streatham, and, but for occafional attacks of the gout, enjoyed feveral years of learned leifure united with fcientific experience, in attention to the bufinefs of his farm, and the care of his family. On the 30th of January 1761, he refigned his profefforfhip of botany in favour of his fon the Rev. Thomas Martyn, who was elected in his ftead, and who has ever fince filled that ftation with honour to himfelf and to his parent. In gratitude for this election, fo confonant to his own wifhes, Mr. Martyn, fome time afterwards, gave his botanical library, of above 200 volumes, with his drawings, herbarium, and collections of feeds and *Materia Medica*, to the univerfity, for which the thanks of that body were very handfomely returned him in 1765.

This worthy man died at Chelfea, to which place his increafing infirmities had induced him, about a year previous, to return, on the 29th of January 1768, in the fixty-ninth year of his age, and was interred in the burying-ground there, near his firft wife; where alfo the relics of Miller, Ehret, and, if we miftake not, of feveral other botanifts, repofe. Our account of him is chiefly taken from a fmall volume,

volume, published in 1770, by his amiable son and successor, who commemorates, in the highest terms, his religious, liberal, benevolent, and affectionate character. This volume contains some of his epistolary correspondence, and several learned dissertations, preparatory to his intended edition of the *Æneid*. The present Professor Martyn is known by several ingenious works, especially by his greatly enlarged edition of Miller's Gardener's Dictionary, to the botanical part of which we have occasion, in the course of our labours, perpetually to refer. S.

MARTYNIA, in *Botany*, was so called by Dr. Houstoun, after his friend Mr. John Martyn, professor of Botany at Cambridge, father of the present professor; see the last article.—Linn. Gen. 310. Schreb. 406. Willd. Sp. Pl. v. 3. 263. Mart. Mill. Dict. v. 3. Red. Houst. 5. t. 10. Ait. Hort. Kew. ed. 1. v. 2. 339. Juss. 140. Lamarck Illustr. t. 537. Gærtn. t. 110. (Craniolaria; Linn. Gen. 310. Juss. 140.)—Class and order, *Didynamia Angiospermia*. Nat. Ord. *Personatæ*, Linn. *Bignoniæ*, Juss.

Gen. Ch. *Cal.* Perianth inferior, in five unequal segments, withering. *Cor.* of one petal, bell-shaped; tube inflated; spreading upwards, gibbous, and bearing honey, on one side at the base; limb in five obtuse, nearly equal segments, the lowermost rather the largest and most erect, slightly concave and crenate. *Stam.* Filaments four, thread-shaped, incurved, with the short pointed rudiment of a fifth between the upper pair; anthers two-lobed, converging, the two uppermost sometimes abortive. *Pist.* Germen superior, oblong; style thread-shaped, simple, as long as the stamens; stigma two-lobed. *Peric.* Capsule woody, oblong, gibbous, quadrangular, with two furrows at each side, pointed and recurved at the summit, separating into two parts, enclosing an internal nucleus of four cells. *Seeds* several, ovate, tuberculated with a pulpy coat.

Eff. Ch. Calyx five-cleft, inferior. Corolla ringent. Capsule woody, coated, with a hooked point, two valves and four cells. Seeds several, ovate, pulpy.

Obs. The *Martynia perennis* of Linnæus, having an inferior germen, and very different fruit, is now made a distinct genus. See GLOXINIA.

1. M. *diandra*. Diandrous Martynia. Gloxin. Obs. 14. t. 1. Willd. n. 1. Jacq. Hort. Schoenbr. v. 3. 21. t. 289. (M. annua, villosa et viscosa, folio subrotundo, flore magno rubro; Houst. in Mart. Decad. 42. t. 42.)—Stem branched. Leaves heart-shaped, toothed. Two stamens abortive. Beak of the capsule very short.—Discovered at Vera Cruz in South America, by Dr. Houstoun, who sent seeds to Chelsea garden in 1731, which being sown in a hot-bed, the plants flowered after midsummer. The *root* is annual. The whole *plant* downy, viscid, soft, juicy, and fœtid, of luxuriant growth. *Stem* a yard high, as thick as the finger, round, hollow, leafy; branched and purplish above. *Leaves* opposite, heart-shaped, acute, toothed, pliable, six or eight inches in diameter, on long, round, purplish, spreading *footstalks*, without *stipulas*. *Clusters* from the forks of the stem, of several pendulous handsome *flowers*, the size and shape nearly of the Purple Foxglove, but their tube is nearly whole and downy, their limb of a rich crimson. Each *flower* has a pair of ovate purplish downy *bracteas*, at the base of its calyx, and equal to that part in length. *Capsule* ovate, about an inch long, with a very short recurved beak.

2. M. *Craniolaria*. Five-lobed Martynia. Gloxin. Obs. 14. Swartz Obs. 230. (M. spathacea; Lamarck Dict. v. 2. 112. M. annua, villosa et viscosa, aceris folio, flore albo, tubo longissimo; Ehrh. Pict. t. 1. f. 2. Craniolaria annua; Linn. Sp. Pl. 862. Mant. 417. Jacq. Amer. 173. t. 110.)—Stem branched. Leaves five-lobed, toothed. Beak of the capsule very short. Tube of the corolla thread-shaped, very long. Calyx sheath-like.—Found by Jacquin in cultivated fields, and ground lately cleared from wood, at Carthagena in South America, flowering in June and July, and ripening seed in October. We have not heard of this species having ever been brough to Europe. It has the viscid downy habit, and rank growth, of the rest of the genus. *Root* annual. *Stem* branched from the very bottom, widely spreading. *Leaves* opposite, stalked, large, divided half-way down into five acute toothed lobes; heart-shaped and three-nerved at the base. *Clusters* chiefly from the forks of the stem, lax, erect, almost a foot long, about ten-flowered. The *flowers* are inodorous, white, remarkable for their slender tube, which is five times as long as their broad rounded limb, and swells suddenly at the top into a globose or ovate figure. The *calyx* is ovate, tumid, split down on one side only, its border very slightly cloven. All the *stamens* are fertile. *Capsule* much like the preceding.

3. M. *Proboscidea*. Long-beaked Martynia. Ait. Hort. Kew. n. 1. Gloxin. Obs. 14. (M. annua; Linn. Sp. Pl. 862. Swartz Obs. 230. Gærtn. v. 2. 131. t. 110. M. caule ramoso, foliis cordato-ovatis pilosis; Mill. Ic. 191. t. 286. Proboscidea Jussieui; Schmid. Ic. 49. t. 12, 13.)—Stem branched. Leaves heart-shaped, wavy. Beak longer than the capsule. Tube of the corolla scarcely longer than the limb.—Native of the country about the Mississippi, from whence seeds were brought to the Paris gardens. Miller had some of the produce, and the plants flowered with him at Chelsea, before the year 1759, when he published his very excellent figure of this species, surpassed only by the elaborate and exquisite delineations of Schmidel. Linnæus had this plant also in the Upsal garden; and it is doubtless what he intended by M. *annua*, though he confounded the first species, if not the second also, with it. As the whole genus is annual, the above expressive name has been preferred. The *leaves* are heart-shaped, obtuse, undivided, and nearly entire, sometimes, but not invariably, alternate; their footstalks and ribs very hairy. *Clusters* terminal, many-flowered, lax, and hairy. *Calyx* bell-shaped, very unequally five-lobed. *Bracteas* at its base linear. *Corolla* pale flesh-coloured, internally dotted with purple; its tube declining, an inch long, and about half as much in diameter; limb in five broad, obtuse, wavy segments, almost as long as the tube, at least if their combined base be reckoned as a part of the limb; there are about five longitudinal orange stripes, within the tube, along its lower side. The *capsule* is remarkable for its long beak, and for a longitudinal crest-like internal ridge, connecting the nucleus with the coat. The *stigma* consists of two flat obovate valves, which Turra observed to be irritable, closing when touched.

4. M. *longiflora*. Long-flowered Cape Martynia. Linn. Syst. Veg. ed. 14. 559. Ait. Hort. Kew. n. 2. Meerburgh Ic. t. 7. (M. capensis; Gloxin. Obs. 13.)—Stem nearly simple. Leaves roundish, wavy. Capsule with two teeth at the base, and a very short abrupt beak. Tube of the corolla thrice as long as the limb.—Native of the Cape of Good Hope. Professor David van Royen sent its seeds to Linnæus, by the name of a new *Pedalium*. These vegetated and produced flowers in the Upsal garden. A sketch, which appears to be the prototype of Meerburgh's rude but expressive plate, was sent with the seeds. This is the least beautiful of the genus. It is annual like the rest, but more hardy, flowering in the greenhouse in July and August. The *stem* bears only short axillary branches. The *leaves* are rounded, and wavy, or bluntly toothed, nearly smooth.

Flowers

Flowers axillary, solitary, on shortish stalks, at whose base is a pair of glands. *Calyx* very small and short, with five teeth. *Corolla* white; tube declining, two inches long, slender, but less so than that of M. *Craniolaria;* limb in five irregular roundish lobes. *Capsule* oblong, with a pair of recurved teeth above, near the base, and an oblique, abrupt, scarcely hooked, very short beak. The *stigma* is linear and revolute.—There are considerable aberrations in various parts of the fructification in the different species, and yet the whole undoubtedly constitute a most natural genus, well defined by its fruit.

MARTYNIA, in *Gardening*, contains plants of the tender, herbaceous, flowery kind, of which the species mostly cultivated are, the two-stamened Martynia (M. diandra); the hairy Martynia (M. proboscidea); and the perennial Martynia (M. perennis).

But there are other species which may be cultivated.

Method of Culture.—The two first sorts of these plants may be increased by sowing the seeds in pots filled with light rich mould, in the spring, plunging them in a bark-hot-bed, giving water frequently. When the plants have attained a little growth, they should be removed into separate pots of the same sort of earth, replunging them in the bark-bed, giving due water and shade, till they become properly rooted, when they must have free air in fine weather: after they are a little advanced in their growth, they should be removed into larger pots, and be replaced in the bark-bed in the stove, due room being allowed them. They should constantly be kept in this situation, and be duly watered and supplied with fresh air in warm weather.

And the third sort may be raised by dividing the roots, and planting them in the spring, as about the middle of March, in pots of light rich earth, being plunged in the bark-bed of the stove. When the plants are up, they should be duly watered in a slight manner, and in warm weather fresh air be freely admitted, keeping them from being shaded by other plants. Even the cuttings of the shoots of the young stems planted in pots, and managed in the above manner, will also take root and form plants.

These afford ornament and variety among other stove plants.

MARTYR, JUSTIN, in *Biography*, a Christian father, who flourished about the year 140 of the Christian era, was the son of Priscus, and born in Flavia Neapolis, anciently called Sichem, a city of Samaria, in Palestine. He was born, according to Tillemont, in 103, but, according to Fabricius and Grabe, in 89. In his youth, he was a lover of truth, and studied philosophy under several masters; first under a Stoic, next a Peripatetic, then a Pythagorean, and lastly, a Platonic, whose principles he preferred above all other, till he became acquainted with the Christian religion, which he embraced as the only certain and useful philosophy. The time of his conversion to Christianity is uncertain: Cave and Tillemont conjecture, that it happened about the year 132 or 133. The first of these writers gives the following account of the course of his life, after his conversion. In the beginning of the reign of Antoninus the Pious, he came to Rome; and in the year 140 presented his First Apology to that emperor. Afterwards he went into Asia, where he had the celebrated conference with Trypho the Jew; and then returned again to Rome, where he wrote his Second Apology, inscribed to Marcus Antoninus, the philosopher, and suffered martyrdom about the year 164. Tillemont is inclined to place his death in 167 or 168. Fabricius supposes that he suffered martyrdom in the 74th year of his age, A.D 163; but Grabe refers his martyrdom to the year 163 or 165, in the 74th or 76th year of his age.

Justin is mentioned by many ancient Christian writers, who bear honourable testimony to his memory.

Eusebius, besides the accounts he had before given of Justin's books against Marcion, and all heresies, and his apologies, gives also this distinct enumeration of his works. He says, that Justin left behind him a great number of very useful works; as his Apology to Antoninus the Pious, and his sons, and the Roman senate, and another to his successor; a book against the Greeks (or Gentiles); another book against the Gentiles, called Elenchus (or a Confutation); another of the Monarchy of God; another, entitled Psalter; of the Soul; a Dialogue against the Jews, which he had at Ephesus with Trypho. There are also, says Eusebius, many other books of his, which are in the hands of the brethren. Jerom's account of Justin's works agrees with that of Eusebius.

However, the principal works of Justin are his two Apologies, and his Dialogue with Trypho the Jew, in two parts. According to Tillemont, with whom Grabe and the Benedictine editors of Justin's works agree, the first and larger apology was not presented to the emperor before the year 170 Cave says that it was presented in 140; Pagi and Basnage refer it to the year 139, and Massuet to about 145. The Dialogue with Trypho was written, according to Pagi and Basnage, in the year 139; and according to Massuet and the Benedictines, about the year 155. The Second Apology seems to have been presented to Marcus Antoninus in the beginning of his reign, or about the year 162. The larger Apology is still extant entire: the beginning of the second apology is wanting; and so is the conclusion of the first and beginning of the second part of the Dialogue with Trypho. Besides these, there are two Discourses to the Gentiles, generally allowed to be Justin's; one called an Oration to the Gentiles, the other παραινεσις, or an exhortation to the Gentiles, supposed to be the Elenchus mentioned by Eusebius. The piece now extant of the Monarchy of God, seems to be a fragment of that work of Justin. The epistle to Zeno and Serenus is at best doubtful, and thought by Lardner not to be Justin's. The epistle to Diognetus is generally supposed to be Justin's, though some have doubted it, on account of the style, which is more elegant than that of Justin's other pieces. The Questiones et Responsiones ad Orthodoxos, and some other pieces usually joined with Justin's works, are allowed to bear the marks of a later time.

In Justin's works there are numerous quotations of our gospels, except that of St. Mark, which he has seldom quoted: and he quotes them, as containing authentic accounts of Jesus Christ and his doctrines. These gospels were read and expounded in the solemn assemblies of the Christians, as the books of the Old Testament were; and as they had been before in the Jewish synagogues. This reading of the gospels Justin mentions in his first apology to Antoninus the Pious. This general reading of the gospels, as a part of divine worship at that time, about the year 140, or not very long after, is not only a proof that they were well known, and allowed to be genuine, but also that they were in the highest esteem. Other passages alleged by Dr. Lardner, relate to the Acts of the Apostles, the Epistle to the Romans, the first to the Corinthians, the Epistles to the Galatians, Ephesians, Philippians, and Colossians, the second to the Thessalonians, the Epistle to the Hebrews, the second of Peter, and the book of the Revelations.

Of Justin's works there have been numerous impressions; but that of Prudent Marand, a learned Benedictine, printed at Paris in 1742, fol. and Styan's Thirlby's edition of the two Apologies, and Dialogue with Trypho, printed at London-

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don in 1722, fol. are the beſt. Fabr. Bibl. Eccl. ad Hieron. c. xxiii. Cave's Hiſt. Lit. vol. i. Lardner's Works, vol. ii. Brucker's Hiſt. Phil. by Enf. vol. ii.

Martyr, or Martire, Peter, a native of Anghierra, in the Milaneſe, was born in 1455. He is diſtinguiſhed in hiſtory as an able negociator, and was employed by Ferdinand V., king of Caſtile and Arragon, in the education of his children. He obtained ſome eccleſiaſtical benefices, and died in 1525. He wrote a hiſtory of the diſcovery of America, under the title of "De Rebus Oceanicis et Orbe novo:" an account of his embaſſy, which he undertook at the deſire of Ferdinand, with a deſcription of the countries through which he paſſed, entitled "De Legatione Babylonica;" and a work entitled "Epiſtolæ de Rebus Hiſpanicis," containing a hiſtory of the moſt memorable events in his time, from 1488 to 1525. After his return from Egypt, he was rewarded with eccleſiaſtical preferment, and received many favours from pope Adrian VI., who would have taken him to Rome, had he not excuſed himſelf on account of his advanced age. He died about the year 1526, and was buried in the cathedral of Grenada, of which he was canon and prior. Gen. Biog.

Martyr, Peter, a diſtinguiſhed reformer in the ſixteenth century, was born at Florence in the year 1500. He was initiated into the principles of the Latin language by his mother, who was ſo well ſkilled in that tongue, as to be able to interpret the comedies of Terence from the original. He was afterwards placed under the tuition of a very able maſter, who taught the children of the principal families in the republic, among whom Peter diſtinguiſhed himſelf by the avidity which he diſcovered for learning, his inceſſant application, and his rapid progreſs. When he was ſixteen years of age, he conceived an inclination for the monaſtic life, and took the habit among the regular canons of St. Auguſtine, at the monaſtery of Fieſoli, near Florence. This ſtep was taken without the conſent or knowledge of his father, who on that account left the bulk of his property, at his death, to an hoſpital, reſerving only a ſmall annuity for his ſon. In the monaſtery he went through the different branches of ſcience uſually taught there, and acquired the character of the firſt ſcholar in his order, and he was as eloquent as he was learned. At the age of twenty-ſix he was appointed to the ſervice of the pulpit, and preached to very crowded auditories, with univerſal applauſe, in ſeveral of the principal cities of Italy. Notwithſtanding his great popularity, and his preferments in the church, particularly that of principal of the college of St. Peter at the altar in Naples, a poſt of great dignity, and ſupported by ample revenues, he cheerfully relinquiſhed all, on account of the conviction which he felt upon the peruſal of the writings of Luther, Zuingle, and Bucer. His ſentiments having undergone a complete change he did not ſcruple privately to make converts to the new doctrines; at length his zeal carried him ſo far as to lead him to avow his ſentiments in his public diſcourſes. This kind of freedom quickly excited a hoſt of enemies againſt him, and he was ſummoned to give an account of his conduct before a general meeting of the order at Genoa. Peter, however, knew what ſort of a tribunal it was before which he was commanded to appear, and accordingly withdrew privately to Piſa, where he wrote letters in juſtification of his ſudden departure, and where he celebrated the Lord's-ſupper according to the manner of the reformed. From Piſa he went to Florence, where he met with the celebrated Bernard Ochinus, who, like himſelf, had embraced the Proteſtant faith, and determined to renounce his country rather than ſhrink from the conſcientious diſcharge of his duty. Quitting Florence, he paſſed through the northern parts of Italy without being diſcovered, and arrived ſafe in Switzerland, where he was received with the greateſt hoſpitality by the miniſters of Zurich in the year 1542. He was ſhortly after this invited to Straſburg, at which city he filled, for the ſpace of five years, the theological chair, and maintained the utmoſt harmony with Bucer, who was his colleague in the miniſterial office. In 1546, he married a nun who had eſcaped from a convent and become a Proteſtant; and in the following year he was invited by king Edward VI. into England, together with Bucer, Fagius, and other learned reformers. He gladly embraced the offer thus made him, and was, in 1549, appointed profeſſor of divinity at the univerſity of Oxford. He was promoted by the king to a canonry of Chriſtchurch, and admitted to the degree of doctor of divinity in this univerſity. In this ſituation Peter Martyr continued faithfully and diligently occupied in diſſeminating ſcriptural knowledge, till the death of the king, and the acceſſion of queen Mary, when the kingdom was once more brought under the yoke of Rome. On this event, Peter Martyr was obliged to leave the kingdom. He had the good fortune to arrive ſafely at Straſburg, when he was very ſoon replaced in the divinity chair, from whence he removed to Zurich in 1556, to undertake the profeſſorſhip of divinity, which had juſt become vacant. Here he ſpent ſeven of the happieſt years of his life, in high reputation as a profeſſor and miniſter, greatly reſpected by all ranks of people, and in habits of intimate friendſhip with Bullinger and other learned men. Upon the acceſſion of Elizabeth to the crown of England, and the re-eſtabliſhment of the Proteſtant religion, great pains were uſed to bring him back again to the profeſſorſhip of Oxford, but without ſucceſs. In 1561, he was earneſtly requeſted by the queen-mother of France, the king of Navarre, the prince of Conde, and many of the moſt diſtinguiſhed peers of France, to attend and aſſiſt at the famous conference at Poiſſy: here he was diſtinguiſhed by his ſkill in diſputation, as well as by the temper and prudence with which he conducted himſelf, and by his great zeal in juſtifying the ſufficiency of the ſcriptures, as a teſt of truth as well as the rule of life. He died at Zurich in the year 1562, ſoon after he had completed the ſixty-ſecond year of his age. He was author of many learned works, eſpecially of "Commentaries on moſt of the Books of the Old Teſtament, and on the Epiſtle of St. Paul to the Romans, and the firſt Epiſtle to the Corinthians." Of the firſt reformers no one, excepting Calvin, wrote better than Peter Martyr, and he even ſurpaſſed Calvin in erudition and the knowledge of the languages. He was thoroughly acquainted with the writings of the fathers, and applied himſelf moſt diligently to the ſtudy of the ancient diſcipline of the church. His theſes were ſaid to be extremely judicious, and his ſermons eloquent and abounding in good maxims. After his death was publiſhed a poſthumous work entitled "Petri Martyris Vermilii, &c. Loci communes," conſiſting of ſelections from his works, digeſted into an uniform treatiſe, and ſyſtematically arranged after a ſimilar manner with Calvin's Inſtitutions. Moreri.

Martyr, a perſon who ſuffers torments, and even death, in defence of the truth of the goſpel: and thus they are diſtinguiſhed from confeſſors. See Confessor.

The word is Greek, μαρτυς, and properly ſignifies a *witneſs*. It is applied, by way of eminence, to thoſe who ſuffer in teſtimony to the truth of the goſpel.

Anciently thoſe who were baniſhed for the faith, were called martyrs, and alſo thoſe who periſhed in the holy wars. In the time of St. Auguſtine, the title of martyr was

was given to confeffors, or thofe who were tortured for the faith, without lofing their lives. It is Tertullian's thought in his Apologetic: "Plures efficimur, quoties metimur; femen ecclefiæ eft fanguis Chriftianus."

St. Stephen is called the *proto-martyr*, or firft martyr.— The firft three or four ages of the church were ftained with the blood of martyrs, who fuffered for the name of Jefus. The greatnefs of their number is acknowledged by all who have a competent acquaintance with ancient hiftory, and who have examined that matter with any degree of impartiality. Accordingly, 19,700 are computed to have fuffered martyrdom with St. Irenæus at Lyons, under the empire of Severus: 6666 foldiers of the Theban legion are faid to have been martyred in Gaul: father Papebroch reckons 16,000 Abyffinian martyrs, and 150,000 others under Dioclefian alone.

Mr. Dodwell, however, endeavours to invalidate the unanimous decifions of the ancient hiftorians, and to prove in a differtation (De Paucitate Martyrum), that the number of martyrs who fuffered under the Roman emperors was very moderate; alleging, that thofe of whom we have accounts in the fathers, are comprehended within a very fmall compafs; and that, excepting Nero and Domitian, the reft of the emperors made fcarcely any.

After Dodwell, feveral writers have maintained his opinion, and afferted, that whatever may have been the calamities which the Chriftians, in general, fuffered for their attachment to the gofpel, very few were put to death on that account. In this number we may include Mr. Gibbon, the celebrated hiftorian of "The Decline and Fall of the Roman Empire," who, after obferving that "the deaths of a few eminent martyrs have been recorded with care," profeffes "to feparate (if it be poffible) a few authentic as well as interefting facts from an indigefted mafs of fiction and error, and to relate, in a clear aad rational manner, the caufes, the extent, the duration, and the moft important circumftances of the perfecutions to which the firft Chriftians were expofed." Of thefe perfecutions we propofe to give an account under the article PERSECUTION; and we fhall leave it to the attentive and candid readers of the 16th chapter of our author's fecond volume to judge, how far he has acquitted himfelf with impartiality, and with juftice to the fuffering Chriftians or their unrelenting perfecutors. "Hiftory," the ingenious hiftorian very properly obferves, "which undertakes to record the tranfactions of the paft, for the inftruction of future ages, would ill deferve that honourable office, if fhe condefcended to plead the caufe of tyrants, or to juftify the maxims of perfecution."—"It muft, however," he fays, "be acknowledged, that the conduct of the emperors who appeared the leaft favourable to the primitive church, is by no means fo criminal as that of modern fovereigns, who have employed the arm of violence and terror againft the religious opinions of any part of their fubjects. From thefe reflections, or even from their own feelings, a Charles V. or a Louis XIV. might have acquired a juft knowledge of the rights of confcience, of the obligations of faith, and of the innocence of error. But the princes and magiftrates of ancient Rome were ftrangers to thofe principles which infpired and authorifed the inflexible obftinacy of the Chriftians in the caufe of truth, nor could they themfelves difcover in their own breafts any motive which would have prompted them to refufe a legal, and as it were, a natural fubmiffion to the facred inftitutions of their country. The fame reafon which contributes to alleviate the guilt, muft have tended to abate the rigour, of their perfecutions. As they were actuated, not by the furious zeal of bigots, but by the temperate policy of legiflators, contempt muft often have relaxed, and humanity muft frequently have fufpended, the execution of thofe laws, which they enacted againft the humble and obfcure followers of Chrift." After this general apology for the ancient perfecutors of the Chriftians, our author proceeds to deduce, from a general view of their character and motives, the following conclufions in their favour: "1. That a confiderable time elapfed before they confidered the new fectaries as an object deferving the attention of government. 2. That in the conviction of any of their fubjects who were accufed of fo very fingular a crime, they proceeded with caution and reluctance. 3. That they were moderate in the ufe of punifhments; and 4. That the afflicted church enjoyed many intervals of peace and tranquillity." How far thefe conclufions are juftified by the facts which our author adduces, we leave for the prefent to the judgment of the reader, and refer him to the article PERSECUTION. To the humanity of the Roman magiftrates he afcribes the inconfiderable number of Chriftian martyrs. "The martyrs," he fays, "devoted to immediate execution by the Roman magiftrates, appear to have been felected from the moft oppofite extremes. They were either bifhops and prefbyters, the perfons the moft diftinguifhed among the Chriftians by their rank and influence, and whofe example might ftrike terror into the whole fect; or elfe they were the meaneft and moft abject among them, particularly thofe of the fervile condition, whofe lives were efteemed of little value, and whofe fufferings were viewed by the ancients with too carelefs an indifference. The learned Origen, who, from his experience as well as reading, was intimately acquainted with the hiftory of the Chriftians, declares, in the moft exprefs terms, that the number of martyrs was very inconfiderable. His authority alone would be fufficient to annihilate that formidable army of martyrs, whofe relics, drawn for the moft part from the catacombs of Rome, have replenifhed fo many churches, and whofe marvellous achievements have been the fubject of fo many volumes of Holy Romance." Our author adds, "that the general affertion of Origen may be explained and confirmed by the particular teftimony of his friend Dionyfius, who, in the immenfe city of Alexandria, and under the rigorous perfecution of Decius, reckons only ten men and feven women, who fuffered for the profeffion of the Chriftian name." The number of martyrs, according to our author, was owing in a great degree to the diftinctions that were conferred on their remains and on their memory by furvivors. "The fober difcretion of the prefent age, will more readily cenfure than admire, but can more eafily admire than imitate, the fervour of the firft Chriftians, who, according to the lively expreffion of Sulpicius Severus, demand martyrdom with more eagernefs than his own contemporaries folicited a bifhopric." "The Chriftians fometimes fupplied by their voluntary declaration the want of an accufer, rudely difturbed the public fervice of Paganifm, and rufhing in crowds round the tribunal of the magiftrates, called upon them to pronounce, and to inflict the fentence of the law." And it is added, that "the more prudent rulers of the church found themfelves obliged to reftrain the indecent ardour of their followers, and to diftruft a conftancy which too often abandoned them in the hour of trial." In forming an eftimate of thofe who fuffered death in confequence of the edicts publifhed by Dioclefian, his affociates, and fucceffors, our author, deriving his data from the hiftory of Eufebius, who enumerates the martyrs of Paleftine at 92, confiders Paleftine as the 16th part of the eaftern empire; and fuppofing that the country which had given birth to Chriftianity produced at leaft the 16th part of the martyrs, who fuffered

 death

death within the dominions of Galerius and Maximin; he infers, that the whole might consequently amount to about 1500: a number which, if it be equally divided between the 10 years of the persecution, will allow an annual consumption of 150 martyrs. "Allotting the same proportion to the provinces of Italy, Africa, and perhaps Spain, where, at the end of two or three years, the rigour of the penal laws was either suspended or abolished, the multitude of Christians in the Roman empire, on whom a capital punishment was inflicted by a judicial sentence, will be reduced to somewhat less than 2000 persons, since it cannot be doubted that the Christians were more numerous, and their enemies more exasperated, in the time of Diocletian, than they had ever been in any former persecution. This probable and moderate computation may teach us to estimate the number of primitive saints and martyrs, who sacrificed their lives for the important purpose of introducing Christianity into the world." Our author concludes his remarks upon this subject, with suggesting a melancholy truth, which, whatever may be thought of his general reasoning, will be both allowed and lamented. "Admitting," he says, "all that history has recorded, or devotion has figured, on the subject of martyrdoms, it must still be acknowledged, that the Christians, in the course of their intestine divisions, have inflicted far greater severities on each other, than they had experienced from the zeal of infidels."—"In the Netherlands alone, more than 100,000 of the subjects of Charles V. are said to have suffered by the hand of the executioner; and this extraordinary number is attested by Grotius." (Annal. de Rebus Belgicis, l. i. p. 12. fol. ed.) If this be admitted as true, it must follow, that the number of Protestants who were executed in a single province, and a single reign, far exceeded that of the primitive martyrs in the space of three centuries, and of the Roman empire."

Whilst some have diminished the number of Christian martyrs far below the standard of truth; others have probably erred as much in the other extreme.

F. Ruinart, (in the preface to his "Selecta et Sincera Martyrum Acta. Amst. 1713,) endeavours to prove, that the catalogue of martyrs is not at all swelled; that the carnage was immense under the first emperors, and especially in the time of Diocletian. F. Papebroch, in his "Acta Sanctorum," also makes the number of martyrs immense. The truth lies probably between the extremes.

The martyrs were less in number than several of the ancient and modern writers have supposed them to be, but much more numerous than Dodwell and his followers are willing to believe; and this medium will be easily admitted by such as have learned from the ancient writers, that, in the darkest and most calamitous times of the church, all Christians were not equally or promiscuously disturbed, or called before the public tribunals. Those who were of the lowest rank of the people escaped the best; their obscurity, in some measure, screened them from the fury of persecution. The learned and eloquent, the doctors and ministers, and chiefly the rich, for the confiscation of whose fortunes the rapacious magistrates were perpetually gaping, were the persons most exposed to the dangers of the times. Mosheim's Eccl. Hist. vol. i.

There is scarcely any faith or religion that does not pretend to its martyrs: Mahometans, heathens, idolaters, &c. all have their martyrs.

In the ancient church, the acts, sayings, sufferings, and deaths of the martyrs, were preserved with great care, in order to be read on certain days, and thus proposed as models to future ages: and yet, notwithstanding all this diligence, we have but very little left of them: the greatest part of them having been destroyed, during that dreadful persecution, which Dioclesian carried on for ten years, with fresh fury, against the Christians: for a most diligent search was then made after all their books and papers; and all of them that were found were committed to the flames. Eusebius, indeed, composed a martyrology, but it never reached down to us; and those since compiled are extremely suspected.

From the eighth century downwards, several Greek and Latin writers endeavoured to make up the loss, by compiling, with vast labour, accounts of the lives and actions of the ancient martyrs: but most of them have given us little else than a series of fables, adorned with profusion of rhetorical flowers, and striking images, as the wiser, even among the Romish doctors, frankly acknowledge. Nor are those records, that pass under the name of Martyrology, worthy of superior credit, since they bear the most evident marks both of ignorance and falshood.

Martyrs, *Era of*, is an era followed in Egypt and Abyssinia, and which even the Mahometans, since their becoming masters of Egypt, frequently observe. See Epocha.

The era of martyrs is also called the era of Dioclesian.

Martyrs, *Knights of the*, in Palestine and Jerusalem, or of St. Cosmo and Damian, an order which, according to Giustiniani, was instituted in the 10th century, and afterwards approved and confirmed by pope Jean XX. in the year 1024. The badge of this order is said to have been a red cross, formed of four equal shafts, the centre thereof charged with the figures of the saints Cosmo and Damian, placed within a circle. But Giustiniani is charged with having converted the religious order of canons regular of the Penitence of the Martyrs, who wear a red cross on their white habit, into an order of knighthood.

Martyr's *Reef* and *Shoals*, in *Geography*, a rocky shoal between the gulf of Mexico, on the N. side of the Florida stream. N. lat. 24° 5'. W. long. 81°.

MARTYROLOGY, from μαρτυρ, *witness*; and λεγω, *dico*, *I speak*, or λεγω, *colligo*, *I gather*; a register or catalogue of martyrs.

A martyrology, properly speaking, should contain no more than the name, place, and day of martyrdom of each saint; but the term is frequently extended to the histories of martyrs. The custom of collecting martyrologies is borrowed from the heathens, who inserted the names of their heroes in their Fasti, to preserve to posterity the memory and example of their noble actions. Baronius gives pope Clement the credit of being the first who introduced the custom of collecting the acts of the martyrs.

The martyrology of Eusebius of Cæsarea was the most celebrated in the ancient church. It was translated into Latin by St. Jerom; but the learned agree that it is not now extant. That attributed to Beda, in the eighth century, is of very doubtful authority; the names of several saints being there found, who did not live till after the time of Beda. The ninth century was very fertile in martyrologies; then appeared that of Florus, subdeacon of the church at Lyons; who, however, only filled up the chasms of Beda. This was published about the year 830, and was followed by that of Waldenburtus, monk of the diocese of Treves, written in verse about the year 848, and this by that of Usuard, a French monk, and written by the command of Charles the Bald, in 875, which last is the martyrology now ordinarily used in the Romish church. That of Rabanus Maurus is an improvement on Beda and Florus, written about the year 845; that of Notker, monk of St. Gal, was written about the year 894.

The martyrology of Ado, monk of Ferrieres, in the diocese of Treves, afterwards archbishop of Vienne, is a defcendant of the Roman, if we may fo call it; for Du Sollier gives its genealogy thus: the martyrology of St. Jerom is the great Roman martyrology; from this was made the little Roman one, printed by Rofweyd; of this little Roman martyrology was formed that of Beda, augmented by Florus. Ado compiled his in the year 858. The martyrology of Nevelon, monk of Corbie, written about the year 1089, is little more than an abridgment of that of Ado; father Kircher alfo makes mention of a Coptic martyrology, preferved by the Maronites at Rome. We have alfo feveral Proteftant martyrologies, containing the fufferings of the Reformed under the Papifts; *viz.* an Englifh martyrology, by J. Fox; with others by Clark, Bray, &c.

MARTYROLOGY is alfo ufed, in the *Romifh Church*, for a roll or regifter kept in the veftry of each church, containing the names of all the faints and martyrs, both of the univerfal church, and of the particular ones of that city or monaftery.

MARTYROLOGY is alfo applied to the painted or written catalogues in the Romifh churches, containing the foundations, obits, prayers, and maffes to be faid each day.

MARTZIAN, in the *Materia Medica*, a word formed by the modern Greek writers, to exprefs a fort of fea-plant, growing upon the rocks, and ufed in painting, dyeing, &c.

The word is formed of the Arabian name *margian*, by changing the *g* into *tz*.

MARU, in *Botany*, a name by which Dodonæus, and fome others, have called the *cerinthe*, or *honey-wort*.

MARU, or MARU-*Shah-Jan*, in *Geography*, a town of Perfia, in the province of Khorafan, on the river Morga; formerly a magnificent city, and the refidence of many fultans; but defolated by the Turcomans in the twelfth century; 200 miles N. of Herat. N. lat. 38 42′. E. long. 61° 12′.

MARU-*errud*, or MARU *el Roud*, a town of Perfia, in the province of Khorafan, on the Morga, founded, as fome fay, by Alexander the Great; 125 miles N.E. of Herat. N. lat. 37° 36′. E. long. 61 18′.

MARVAGLIA, a town of Italy, in the bailiwick of Bellinzona.

MARVAO, a town of Portugal, in Alentejo; fix miles S.E. of Caftello de Vide. N. lat. 39° 13′. W. long. 7 2′.

MARUBIUM, in *Botany*, &c. See MARRUBIUM and HOREHOUND.

MARUDO, in *Geography*, a country of the ifland of Borneo, which advances towards the north between four great points, of which the firft, called Sanfaon, is at the diftance of 11 Dutch miles from the fecond, denominated Tandjong Mater; after which follows the bay of Marudo, with a town of the fame name fituated at its bottom. At fome diftance from the fhore are difcovered four large ifles, and fome fmaller. The two other points on the E. of the bay are Pulo Avigo and Punta Corpaon, between which there are fome little ifles. From this laft point the coaft bends to the eaft, and forms a large bay, called that of St. Ann. The country of Marudo is remarkable for forefts and mountains; one of the latter, on the S. of the town of Marudo, called by the Portuguefe and Dutch the mountain of St. Peter, is of prodigious height. In thefe wild countries monkies are very numerous, befides the "orang-outang;" and in the bodies of thefe monkies are found the beft bezoar.

MARVEJOLS, a town of France, and principal place of a diftrict, in the department of the Lozère; nine miles W. of Mende. The place contains 3611, and the canton 8823 inhabitants, on a territory of 222½ kiliometres, in ten communes. N. lat. 44° 33′. E. long. 3° 22′.

MARVEL *of* PERU, or *Four-o'clock Flower*. See MIRABILIS.

MARVELL, ANDREW, in *Biography*, a political writer of confiderable eminence, was the fon of a clergyman, and born at Kingfton-upon-Hull, in the year 1620. He was fent to Cambridge at the expence of the corporation of Hull, and was entered a ftudent of Trinity college in 1635. His fine talents rendered him an object for the tempting arts of the Jefuit emiffaries, then perpetually lurking about our univerfities, and they fo far fucceeded in their profelyting attempts as to induce him to quit his college and go to London, where he was accidentally found by his father in a bookfeller's fhop. He was perfuaded by his parent to return to Cambridge, and ferious reflection upon the dangers which he had thus efcaped, feems to have left upon his mind a rooted averfion from that fyftem of religion which could make ufe of fuch vile arts to extend its progrefs. His father was unfortunately drowned as he was croffing the Humber, in 1640, and Andrew took poffeffion of his fmall inheritance. This might be the occafion of fome inattention, on his part, to the duties of academical life, for it appears that in the following year he, with fome other young men, were excluded from their college for non-attendance. Perhaps, however, he had then begun the courfe of travels which he purfued through Holland, France, and Italy. He had ever a great propenfity to ridicule, and it was firft publicly difplayed by a fatire upon Flecknoe, an Englifh prieft and poetafter at Rome; and next in a burlefque poem addreffed to an abbot de Maniban, at Paris, a pretender to fortune-telling. Of the refidence and purfuits of Andrew Marvell, for many fubfequent years, little is known. In 1653, he was engaged by the protector Oliver Cromwell, to fuperintend the education of a Mr. Dutton. It was not till four years after this, that he took any part in public affairs, when, he fays, he entered into an employment for which he was not altogether unfit, and which he confidered to be the moft inoffenfive towards his majefty's concerns, of any in that ufurped and irregular government. This alluded to the poft of affiftant to Milton in the office of Latin fecretary, which he held till the death of Cromwell. In the parliament of 1660, Marvell fat as one of the reprefentatives of the borough of Hull, an honour which was conferred upon him to the end of his life. He is fuppofed to have been one of the laft perfons who received a penfion from his conftituents, which he earned by the diligence, firmnefs, and integrity with which he difcharged his duty. At the beginning of the new reign he paid little or no attention to the duties of parliament, and in 1661, and the following years, he was abfent in Holland and Germany, and upon his return he accompanied lord Carlifle, the ambaffador-extraordinary to the northern courts, as his fecretary. In 1665, he renewed a conftant and uniform attendance on parliament, and from this period to 1674, he made a regular report of the proceedings of both houfes to the mayor and corporation of Hull. The whole efforts of Andrew Marvell, in and out of parliament, were directed to the prefervation of civil and religious liberty. He was not a powerful nor a frequent fpeaker, but his influence over the members of both houfes was confiderable. By his writings he obtained the character of the wittieft man of his time, and was of great fervice to the caufe which he efpoufed. In 1672, Dr. Parker, afterwards bifhop of Oxford, publifhed a work of bifhop Bramhall's, to which he prefixed a preface of his own, maintaining the moft extravagant pofitions concerning the rights of fovereigns over the confciences of their fubjects. Marvell immediately attacked him in a work, entitled "The Rehearfal Tranfpofed," which, with a profufion of witty farcafm, contains much folid argument, and may be reckoned one of the ableft expofures of the maxims of religious tyranny. Marvell was author of feveral other works, of which we may notice "A feafonable Argument to the Grand Juries of England to petition for a New Parliament." His laft piece was entitled "An Account of the Growth of Popery and arbitrary Power in England." This was fo very offenfive to the perfons in power, that an advertifement was iffued in the Gazette, offering a reward for the difcovery of the printer, publifher, and author of it. Notwithftanding the acrimony with which our patriot attacked the court and its plans, Charles II. delighted in his converfation, and his minifters took every means in their power either to gain him over to their party, or at leaft to filence him. A remarkable anecdote on this fubject is related. One morning, after he had been the preceding evening familiarly entertained by his majefty, the door of his apartment, up two pair of ftairs, in a court in the Strand, was fuddenly opened by the lord-treafurer Danby. Marvell, who was writing, being furprized, afked his lordfhip if he had not miftaken his way. "No," replied the courtier, "now I have found Mr. Marvell;" and he proceeded to fay he had been fent by his majefty to know in what manner he could ferve him. Marvell rejected every offer, though his lordfhip was commiffioned to prefent him with a thoufand pounds. At the moment that he thus nobly afferted his independence, he was fo deftitute as to be obliged to borrow a guinea of a friend to fupply the neceffary demands of life. Well might his biographer fay, that "of all men in his ftation, he is the perfon who ought to be felected as an example of genuine independence produced by the philofophical limitation of wants and defires. He was not to be purchafed, becaufe he wanted nothing that money could buy, and held cheap all titular honours in comparifon with the approbation of his confcience, and the efteem of the virtuous." He died in 1678, and was buried in the church of St. Giles's-in-the-Fields; and the corporation of Hull, in gratitude for his fervices, defrayed the expences of his funeral, and raifed a monument to his memory. His works were publifhed in two volumes, 12mo., in 1726, and a more complete edition was given to the public in 1776, with a new life of the author, by Capt. Edward Thompfon, in three volumes, quarto, to which our readers are referred.

MARVELLA, in *Geography*, a town of Spain, fituated in a bay on the fea-fhore, three leagues from Malaga, at the foot of fome arid mountains, and containing 1100 inhabitants. From the number of houfes fallen into ruins, and the extent of the walls, part of which ftill remain, and are more than a mile in circumference, we might infer that the population has been much greater. The fea is on the S., and on the N. the mountains of Marvella, on which a few vines are planted. This town has one parifh-church, two monafteries, a hofpital, two fchools, a manfion-houfe, and a prifon. On the fhore a baftion, mounted with two pieces of ordnance, is erected for the defence of the bay, where no large fhip can caft anchor; on the E. and W. fides of the town are fome kitchen-gardens. The inhabitants derive their fubfiftence from fifhing, and the produce of a limited agriculture. They alfo employ twenty barks in conveying leather, charcoal, wood, wine, dried raifins, and black-ftone, &c. to Cadiz, Malaga, and Ceuta. To thefe they may fometimes add the juniper-berries, which the mountains furnifh in great profufion, and of which the Englifh confume great quantities in their dyes.

MARUGGIO, a town of Naples, in the province of Otranto; ten miles S.S.W. of Oria.

MARVILLE, a town of France, in the department of the Meufe; fix miles S.E. of Montmedy.

MARULLUS, Michael Tarchaniotes, in *Biography*, a learned modern Greek, a native of Conftantinople, which city he abandoned at its capture by the Turks in 1453, and retired to Italy. He was engaged in the military fervice, though a fteady adherent to polite literature. He enjoyed the patronage of feveral perfons of high rank, and was for a time liberally entertained by Lorenzo de Medici. He married the learned Alexandra Scala, of Florence, a circumftance that involved him in a bitter quarrel with Politian, who was her admirer. Marullus was engaged in feveral other controverfies with men of learning, which he brought on himfelf by his cenfures of the ancient Latin poets, and his high notions of his own merits. He loft his life in the year 1500, while attempting to crofs the little river Cecina, in Tufcany. His "Latin Poems," which have been frequently republifhed, confift of four books of Epigrams, and four of Hymns, with a fragment of a Poem on the education of princes. He was reckoned a good imitator of Lucretius, who was the principal object of his admiration among the ancients, and of whom he gave an edition. There was another poet of Calabria of this name, in the fifth century, who wrote a panegyric on Attila, king of the Huns, which the barbarian requited by caufing the poet and his poem to be burnt together. Moreri.

MARUM, in *Botany*. See Origanum, Salvia, Teucrium, and Thymus.

MARUT, in *Hindoo Mythology*, is a perfonification of the wind, more commonly called *Pavana*, under which article we fhall more particularly defcribe this potent deity. The Maruts are frequently alluded to in Hindoo books, as the genii or regents of the winds, of whom Pavana is the chief. Eight are ufually fpoken of, and they then feem to correfpond with the guardians of the cardinal and intermediate points, into which the Brahmins have arranged the heavens; reminding us, under this divifion, of the octagonal temple of the winds at Athens. Thefe eight guardians or regents are, 1. Indra, who being efteemed as the firft of firmamental deities, and ruler of the eaft, that point is reckoned firft; and proceeding: 2d. Pavaka, the god of fire, rules the fouth-eaft: 3. Yama, king of death and judge of hell, over the fouth or lower region: 4. Nirit or Nairit, fouth-weft: 5. Varuna, regent of waters, weft: 6. Pavana, otherwife called Vayu, north-weft: 7. Kuvera, the god of wealth, the north: and 8. Ifani, a name and form of Siva, rules the north-eaft. Some mention is made of thefe feveral deities and powers, under their refpective names. Female divinities feem alfo to have dominion over the points of the heavens, as noticed under Matri.

It is not always, however, that we find this arrangement, although it be the moft ufual, followed by Hindoo writers. Other deities are fometimes fubftituted, and their guardianfhips altered. Sir William Jones has addreffed a fpirited hymn to Indra, in which a ftanza is introduced defcriptive of a poetical co-operation of thefe powers, in aid of their chief Indra, the god of fhowers. (See Indra.) It is borrowed from the popular mythology of Nepaul and Thibet, and we will extract the ftanza, as defcriptive of Hindoo mythological poetics; premifing that it relates to a freak of Indra, who is fabled to have affumed the form of a fhepherd's boy, that he might the eafier fteal from a garden fome pomegranate bloffoms, to deck the dark treffes of his virtuous confort *Indrani*; which fee.

"—— The

"—— The recklefs peafant, who thefe glowing flowers,
Hopeful of rubied fruit, had fofter'd long,
Seiz'd, and with cordage ftrong,
Shackled the god who gave him fhowers.
Straight from feven winds immortal genii flew—
Varuna green, whom foamy waves obey;
Bright Vahni, flaming like the lamp of day;
Kuvera, fought by all, enjoy'd by few;
Marut, who bids the winged breezes play;
Stern Yama, ruthlefs judge! and Ifa cold;
With Nairit, mildly bold:
They, with the ruddy flafh that points his thunder,
Rend his vain bands afunder.
Th' exulting god refumes his thoufand eyes,
Four arms divine, and robes of changing dyes."

MARUTY is a name of Hanuman, who, although an ape only in appearance, is yet, in the facred romances of the poetical people of the Eaft, a very important perfonage; and of whom almoft if not fully as much is faid and fung as of any deity in their monftrous, although certainly curious, Pantheon. In their theogonies he is called the fon of Siva, who miraculoufly impregnated the mother in a manner correfponding with the ufual whimficality of thefe tales, if literally received: but popularly he is deemed the offspring of Pavana, the regent of the wind, otherwife called *Marut*, which fee, and hence his name, which means windy. Hanuman means with bloated cheeks.

This fimian hero was produced with a vaft number of others by the celeftials for the purpofe of affifting Rama in his conqueft of Lanka from the tyrant Ravena; which conqueft is the theme of that fingular poem the Ramayana, as noticed under thofe feveral articles. Sir William Jones, hinting at the fimilarity of the Indian conquefts of Dionyfos and Rama, whofe armies of Satyrs were refpectively led by Pan, and the fon of Pavan, finds farther coincidences of character, both in the principals and their general. Pan improved the pipe by additional reeds; Hanuman was alfo a mufical genius, and one of the four fyftems of Hindoo mufic is named after him. In the peninfula of India, and on Ceylon, or Lanka, ftatues, pictures, legends and romances of Hanuman are very common. He is alfo feen on very ancient coins and medals, of which exact reprefentations are given in plate 104 of Moor's Hindoo Pantheon; and many, in other plates of the fubject of this article, with fundry legends refpecting him and his hiftory, that however admiffible in fuch a work, would be evidently mifplaced in this. His building of Rama's bridge between the continent and Ceylon, and fome other points concerning him, are noticed under LANKA. Maruti or Hanuman is reprefented fometimes wholly as a monkey; at others as a man with a monkey's head, and perhaps tail; and with from one to four pair of arms, holding divers weapons, or as a refpectful attendant on Rama, who is feldom feen without him.

MARWICK HEAD, in *Geography*, a cape of Scotland, on the W. coaft of the ifland of Pomona. N. lat. 52° 58'. W. long. 3° 10'.

MARY, the mother of our Saviour Jefus Chrift, in *Scripture Biography*, was the daughter of Joachim and Anna, and efpoufed to Jofeph before the conception and birth of Chrift; fo that our bleffed Lord was by his mother of the tribe of Levi, and by his legal and reputed father Jofeph, of the tribe of Judah.

Of the parents of Mary, we have no information in fcripture, not fo much as of their names, unlefs Heli, mentioned by St. Luke iii. 23, be the fame with Joachim; and, therefore, for the birth of Mary, and for an account of her parents, we are under a neceffity of having recourfe to fome ancient apocryphal writings. It is of principal importance to know, that fhe was of the royal race of David, and fhe was alfo akin to the race of Aaron, fince Elizabeth, the wife of Zacharias, was her coufin. See Luke i. 27. 32, 33. 36.

As the time of Mary's delivery approached, Cæfar Auguftus iffued an edict, commanding the fubjects of the empire to regifter their names, according to their families, in their refpective cities. Jofeph, though he was not rich, and though he lived in Galilee, might have fome fmall inheritance in or near Bethlehem, and might be obliged to go thither upon that account. St. Luke gives us this reafon of his going to Bethlehem, "becaufe he was of the houfe and lineage of David," (ch. ii. v. 4.) It is probable, fays Lardner, that this journey was owing to the cuftom of the Jews; who, whenever they were numbered, entered themfelves according to their tribes and families. Mary accompanied him on this occafion, more perhaps from choice than from any legal neceffity; or for fome fufficient reafons with which we are not acquainted. Whilft they remained at Bethlehem, our Saviour was born in the circumftances recited by the evangelifts. (Luke ii Matt. ii.) Of her vifit to Jerufalem, at the time of her purification and of her prefentation of Jefus in the temple, and of other incidents that occurred in the early period of our Saviour's life, it is fufficient to refer to the evangelical hiftory. We find that Mary was prefent at the marriage of Cana, in Galilee, where our Lord performed his firft public miracle (John ii. 1, 2, &c.), and that fhe accompanied her fon to Capernaum, where fhe feems to have chiefly refided. Epiphanius, however, intimates, that fhe followed him every where during the whole courfe of his public miniftry; but if that was the cafe, it is not recorded by the evangelifts. We find her at Jerufalem at the laft paffover which our Saviour attended; and fhe followed him to Calvary, where fhe ftood at the foot of his crofs, and where fhe was recommended by him, with an attention highly worthy of the dignity of his perfon, and excellence of his character, to the care of his beloved difciple, who from that hour took her to his own houfe. Our Saviour appeared to her after his refurrection, and fhe was one of the firft to whom he vouchfafed this honour and confolation; fhe was alfo with the apoftles at the time of his afcenfion, and continued with them at Jerufalem. (Acts i. 14.) After this, fhe dwelt in the houfe of St. John the Evangelift, who took care of her as of his own mother. As St. John ftaid for a confiderable time in Paleftine, it may be reafonably concluded, that Mary, our Lord's mother, did not go with him to Ephefus, as Baronius and fome others have thought, but died before he went thither, according to the opinion of Cave and Bafnage; and was buried at Jerufalem.

Theophylact fays, that Jofeph had by the widow of his brother Cleophas, who died without iffue, fix children, four fons and two daughters, named Mary, and he fuppofes Mary, mother of our Lord, to be the fame as Mary the mother of James and Jofes, who were Jofeph's children by a former wife; as was alfo Salome, the mother of Zebedee's children. And whereas, in John xix. 25, mention is made of Mary wife or daughter of Cleophas, and fifter to our Lord's mother, he fays, that by "fifter" muft be there underftood "relation," for that Mary is fuppofed to be daughter of Cleophas, brother of Jofeph, whofe widow he had married. He fays, that there are four Maries mentioned in the gofpels; *viz.* our Lord's mother, Mary Magdalene, Mary daughter of Cleophas, and the fifter of Lazarus. Gregory Nyffen fays, that three Maries are mentioned as ftanding at the foot of the crofs of Jefus, Mary our Lord's

Lord's mother, Mary wife of Cleophas, and Mary Magdalene. (John, ubi fupra.) For Mary mother of James, or mother of James and Jofes, as mentioned by the other evangelifts, he cannot but think to be the fame with our Lord's mother; James and Jofes, he fuppofes, to be children of Jofeph, whom he had by a former marriage. Lardner's Works, vols. iv. v.

MARY *Magdalene* has been fuppofed by many to be the perfon called a "Sinner" in the feventh chapter of St. Luke's gofpel; but Dr. Lardner has adduced a variety of circumftances in his "Letter to Jonas Hanway, efq." which make it very probable, that Mary Magdalene was not the perfon to whom the evangelift there refers; and he therefore objects to the appellation Magdalen Houfe, as appropriated to an afylum for penitent proftitutes. Mary Magdalene was fo called, probably from Magdala, the place of her nativity, a town fituated fomewhere befide the lake, and mentioned Matt. xv. 29; whereas it appears from the hiftory in Luke (verfe 27.) that the woman there mentioned was of the city, in which our Lord then was; which city was Capernaum or Naim; and there is no reafon for believing that Mary Magdalene refided at either of thofe places. Another paffage (Luke viii. 1, 2, 3.) affords additional reafons for fuppofing that Mary Magdalene is not the woman intended in the preceding chapter. This Mary appears to have been a woman of high ftation and opulent fortune, not likely to have been defignated under the defcription of "a woman in the city which was a finner;" fhe is mentioned by St. Luke before Joanna, the wife of Herod's fteward; and, befides, when the other evangelifts have occafion to fpeak of our Lord's female friends, they commonly affign the firft place to Mary Magdalene. (See Matt. xxvii. 56. 61. xxviii. 2. Mark xv. 40. 47. Luke xxiv. 10.) Grotius thinks, that it was at her expence the fpices were bought for embalming the body of Jefus. This precedence, as Lardner fuggefts, might have been, partly, owing to her age. Mary Magdalene is mentioned as a perfon who belonged to thofe who were called dæmoniacs. She is alfo mentioned with divers other honourable women, who attended our Lord in his journies, and miniftered to him of their fubftance. And it is juftly queftioned, whether our Lord would have allowed of that, if Mary's conduct had been difreputable in the former part of her life; nor can we reafonably imagine, that any women of diftinction and good credit would admit into their fociety one who had been under the reproach of a diforderly life. Among thefe women was our Lord's mother; and undoubtedly an exact decorum was obferved, according to the Jewifh cuftom. Moreover, Mary Magdalene feems to have prefided in the direction of the affairs, which were under their care. On the other hand, the woman called a "Sinner," was abfolutely excluded from having any part in that company. (Luke vii. 47, 48. 50.) "I conceive of her," fays the judicious and candid Lardner, "as a woman of a fine underftanding, and known virtue and difcretion, with a dignity of behaviour becoming her age, her wifdom, and her high ftation; by all which fhe was a credit to him whom fhe followed as her mafter and benefactor. She fhewed our Lord great refpect in his life, at his death, and after it; and fhe was one of thofe to whom he firft fhewed himfelf after his refurrection. See Matt. xxviii. 1—10. Mark xvi. 9. John xx. 1—18.

Some have fuppofed, that Mary, fifter of Martha and Lazarus, was the fame as Mary Magdalene. Dr. Lardner refutes this opinion, by alleging, that Mary Magdalene derived her name from a place in Galilee; whereas Lazarus and his fifters were inhabitants of Bethany near Jerufalem; Mary Magdalene is frequently named with other women, who attended our Lord in his journies, and came up with him from Galilee to Jerufalem, at the times of the great feafts; whereas Lazarus and his fifters refided at Bethany; and Mary Magdalene is particularly mentioned with others, whom our Lord had miraculoufly healed of infirmities; but nothing of a like kind is ever faid, or hinted of Mary, fifter of Lazarus. We fhall here add, that Mary, fifter of Lazarus, does not feem to have been the woman defcribed by St. Luke as a "Sinner." Lardner's Works, vol. xi.

MARY I. queen of England, in *Biography*, daughter of Henry VIII., by Catharine of Arragon, was born in 1516. In her infancy fhe was betrothed to three different perfons, firft, to the dauphin of France; next, to the emperor Charles V., and afterwards, to the duke of Orleans. Thefe alliances did not take place, and after her mother's death Mary was excluded from the fucceffion to the crown, as illegitimate. In 1544 fhe was reftored to her right, but her illegitimacy was not reverfed; and Henry, though by this act he opened the way for the princeffes to mount the throne, would not allow the former acts to be reverfed; he even obliged his parliament to confer upon him a power of ftill excluding the two fifters, Mary and Elizabeth, if they refufed to fubmit to any conditions which he, at any time, fhould be pleafed to impofe: and he farther required them to enact, that, in default of his own iffue, he might difpofe of the crown as he pleafed, either by will or letters patent. Mary, bred up by her mother in a zealous adherence to the Roman Catholic faith, reluctantly fubfcribed to her father's fupremacy on his breach with the papal fee; and when, upon the acceffion of her brother Edward VI., the reformation was introduced into the Englifh church, fhe refufed, though ftrongly urged and menaced, to comply with the new worfhip, and obtained a connivance through the interference of her kinfman the emperor. "As intolerance," fays one of this princefs's biographers, "was no lefs the character of the new than it had been of the ancient religion, Mary was again molefted; her chaplains were thrown into prifon; urgent remonftrances were made to her without fhaking her firmnefs; and finally, her brother was, with great difficulty, perfuaded ftill to indulge her in her nonconformity."

On the death of Edward in 1553, we have already feen, in the feveral articles relating to this period of our hiftory, that an attempt was made to exclude both Mary and Elizabeth from the crown, by fetting up lady Jane Grey, the failure of which effort has been before noticed. Mary now, by the loyalty of her fubjects, was, without a conteft, placed upon the throne, and her title univerfally recognized. She foon difplayed a paffionate zeal for the reftoration of the Catholic religion: her temper was four and gloomy, and fhe inherited too much the wilfulnefs and defpotic humour of her father. She almoft immediately re-inftated thofe bifhops who, in the late reign, had been deprived of their fees for their adherence to popery, while Cranmer was indicted for the crime of high-treafon, and feveral Proteftant bifhops were thrown into prifon. The next ftep that outraged the feelings, and caft down the fpirits of thofe who adhered to the Proteftant faith, was her marriage to the archduke Philip, fon of the emperor Charles V. Previoufly to this a complete reftoration of the Catholic worfhip took place throughout the kingdom, and all the clergy who refufed to comply with it were ejected from their livings. Thefe changes, which were regarded as preludes to ftill more arbitrary and cruel meafures, occafioned a vaft number of difcontents, that broke out into infurrections in Devonfhire and Kent. In the former, Carew was the leader, in the latter

latter Wyatt: thefe were foon fuppreffed, and they only ferved as pretexts for new feverities. The princefs Elizabeth, who was an object of peculiar hatred to her fifter, on account of her attachment to the principles of the reformers, was thrown into the Tower, and lady Jane Grey, with her unfortunate hufband, whofe lives had hitherto been fpared, were executed. Philip, who had long been expected by the queen, arrived in England in July 1554, and the nuptials were confummated. The ruling paffion of this prince was ambition, which his confort was defirous of gratifying. She had, at this period, another object in view, in the purfuance of which fhe was quite fuccefsful; this was that of reconciling the kingdom to the pope, which was effected in great form by means of the legate, cardinal Pole. The fanguinary laws againft heretics were renewed, and it was determined, in council, to put them into execution. The mercilefs fcenes of cruelty which followed this refolution, have defervedly ftamped the peculiar character of this reign, and indelibly fixed upon the fovereign, the hateful, but well-merited epithet, of *bloody* queen Mary. From various difappointments which fhe met with, as well in the want of a family, as in her hufband's inattention, and in the difcontents of her fubjects, it has been queftioned whether the period of her fhort reign was more afflictive to herfelf, or difaftrous to the nation. It is to the honour of the legate Pole, that he totally difapproved of the feverity of perfecution, but the arguments of Gardiner and others in its favour were fo conformable to the queen's difpofition, that the flames foon began to be kindled in the metropolis and other parts of the kingdom. Proteftants, illuftrious for their talents, and of the pureft moral character, were called upon to feal their faith at the ftake. For an account of the fufferings which this cruel woman inflicted, and of the martyrs which fhe fent to prifon, to exile, and death, we refer to the feveral articles in the work, which have been devoted, as far as the writers have been able, in a fhort compafs, to keep them in "everlafting remembrance." In the fpace of lefs than four years, 277 perfons were committed to the flames, including prelates and beneficed clergymen, laymen of all ranks, women, and even children. It is believed, that neither fhame nor compaffion, nor a regard to her future reputation, ever touched the heart of queen Mary. It might not, perhaps, occur to her that by her dark deeds fhe was raifing a name, that fhould, to the laft records of her country, be held in abhorrence by perfons of all ranks and parties; and that the lifping infant fhould, in almoft their earlieft leffons, learn to dread the found of "the bloody queen." The fincerity of her zeal has been referred to as an extenuation of her crimes, and we would not withhold from her any trait that might tend to make her a lefs hateful object with pofterity: fhe evidenced that fincerity by the facrifices which fhe was ever ready to make of the revenues of the crown, in reftitution of the goods of the church, and more than once, to the remonftrances on this head, fhe replied, in words to the following effect, "that fhe preferred the falvation of her foul, to ten fuch kingdoms." To gratify Philip, fhe warmly promoted a war with France, in conjunction with him, though contrary to the terms of the marriage articles, and the manifeft interefts of the Englifh nation. War was declared in 1557, and the affiftance of the Englifh troops contributed to the victory over the French at St. Quintin. In the following year, the lofs of Calais more than overbalanced any fucceffes that might be achieved in other parts. This town was taken by the duke of Guife in the winter of 1558, after it had been more than 200 years in the poffeffion of England. The difgrace of this circumftance funk deep into the heart of the queen, who had been, fome time before, in a declining ftate of health, occafioned by a dropfical complaint: and fhe expired in the month of November 1588, in the forty-fecond year of her age, and the fixth of her reign. With her expired the dominion of popery in this kingdom, which could never overcome the horror and deteftation which her cruelties had infpired. "It is not neceffary," fays the hiftorian, "to employ many words in drawing the character of this princefs. She poffeffed few qualities either eftimable or amiable, and her perfon was as little engaging, as her behaviour and addrefs. Obftinacy, bigotry, violence, cruelty, malignity, revenge, tyranny; every circumftance of her character took a tincture from her bad temper and narrow underftanding. And amidft that complication of vices, which entered into her compofition, we fhall fcarcely find any virtue but fincerity; a quality which fhe feems to have maintained throughout her whole life; except in the beginning of her reign, when the neceffity of her affairs obliged her to make fome promifes to the Proteftants which fhe certainly never intended to perform. But in thefe cafes a weak bigotted woman, under the government of priefts, eafily finds cafuiftry fufficient to juftify to herfelf the violation of a promife. She appears alfo, as well as her father, to have been fufceptible of fome attachments of friendfhip; and even without the caprice and inconftancy which were fo remarkable in the conduct of that monarch. To which we may add, that in many circumftances of her life fhe gave indications of refolution and vigour of mind, a quality which feems to have been inherent in her family." Hume's Hift. 8vo. vol. iv.

Mary de Medicis, daughter of Francis II., grand duke of Tufcany, and wife of Henry IV. of France, was born at Florence in 1573. On the death of her hufband, in 1610, fhe was appointed regent of the kingdom, in which character fhe difplayed great political intrigue, and planned projects of unbounded ambition. Differences arofe between her and Lewis, which were compromifed by means of Richelieu, whom fhe introduced to the favour of the monarch. But afterwards a violent breach occurred between her and the cardinal, who was fupported by the king. By her intrigues, the nation loft all its influence abroad, and was torn to pieces at home by contending factions. After feveral viciffitudes of fortune, fhe was abandoned by her fon, Lewis XIII. whofe reign had been conftantly difturbed by the civil commotions that fhe had occafioned, was exiled to Bruffels, and all her favourites, even her phyfician, were either banifhed or fent to the Baftile. She died in poverty in the year 1642. She built the fuperb palace of Luxembourg at Paris, and embellifhed that city with aqueducts and other ornaments. Hift. of France, 8vo. 1790.

Mary, queen of Scotland, daughter of James V., was born in the royal palace of Linlithgow, on the 8th of December, 1542. Her mother was Mary, the eldeft daughter of Claude, duke of Guife, and widow of Louis, duke of Longueville. Her father dying a few days after her birth, fhe fcarcely exifted before fhe was hailed queen. After the rejection of a propofal made by Henry VIII. of England to contract her to his fon Edward, an offer was made by the Scots to marry her to Francis, the dauphin fon of Henry II. of France, and in her fixth year fhe was fent into that country for education. She difplayed, on advancing to maturity, a degree of perfonal beauty which was the admiration of a gay and galant court. The opening powers of her mind alfo, and her natural difpofition, afforded early hopes of capacity and merit. After being taught to work with her needle, fhe was inftructed in the Latin language; and is faid to have read and fpoke it with accuracy and fluency.

In

In the feveral modern languages her proficiency was ftill greater, and fhe fpoke the French, the Italian, and the Spanifh tongues, with eafe and propriety. She walked, danced, and rode with enchanting gracefulnefs, and fhe was qualified by nature, as well as by art, to attain to diftinction in painting, poetry, and mufic. When fhe had completed her fifteenth year, the negociations for her marriage were entered upon. It was the object of the French court to obtain by this union that afcendancy over Scotland which the prudent jealoufy of the Scots attempted to guard againft. Her nuptials with the dauphin were celebrated with great pomp in 1558, and her hufband received the "crown matrimonial" of Scotland. On the acceffion of Elizabeth to the throne of England, Mary was obliged by her minifters to put in her claim to that dignity, on the plea of Elizabeth's illegitimacy, and fhe and the dauphin openly, and for a fhort time, affumed the title and arms of king and queen of England. This fatal ftep entailed upon her the perpetual hatred of her rival, queen Elizabeth, and was the principal caufe of all her misfortunes. In 1559, the death of Henry II. raifed his fon, Francis II., to the throne of France, and conferred upon Mary the crown of a queen-confort of that powerful kingdom. Her mother, who had acted as regent, died in 1560, while that country was involved in a war between the Proteftants, fupported by queen Elizabeth, and the Catholics, aided by France. Peace between England and France fucceeded her death, by an article of which Francis and Mary were bound to recognize Elizabeth's title to the Englifh crown, and renounce their own. In a very few months Francis died, leaving his widow overwhelmed with forrow for the lofs of that influence which fhe poffeffed as his queen. Her humiliation, the difgrace of her uncles, the princes of Lorraine, which inftantly followed, and the coldnefs of Catharine of Medicis, the queen-mother, who governed her fon Charles IX., plunged Mary into inexpreffible forrow. She was invited to return to her own kingdom, and fhe endeavoured to reconcile herfelf to her fate. She was now to pafs from a fituation of elegance and fplendour to the very reign of uncivilization and turbulence, where moft of her accomplifhments would be loft, and none of them could be properly appreciated. Among the Scots of that period, elegance of tafte was but little known: the generality of the people were funk in ignorance and barbarifm, and what was denominated religion, dictated to all a petulant rudenefs of fpeech and conduct to which the queen of France was wholly unaccuftomed. At length, however, though much againft her inclination, fhe embarked, bidding farewel, with fighs and tears, to the beloved land which had fo long foftered her, nor could fhe be prevailed on to quit the deck till its coafts were quite out of view. She arrived in Scotland in Auguft 1561, after an abfence of almoft thirteen years.

It cannot be expected, that in the limits to which this article muft neceffarily be kept, that we can enter into all the controverfy to which the hiftory of this queen has given rife. It will be fufficient for the readers of the Cyclopædia, if we give a concife narrative of undifputed and indifputable facts, following, in a great meafure, Dr. Robertfon as our guide.

When the queen arrived, the Proteftant caufe in Scotland was efpoufed by the majority of the people, but had not as yet obtained an eftablifhment, and its adherents were full of fufpicions of the machinations of the popifh party, fupported by the court of France, and by the fecret attachment of Mary, who was zealoufly devoted to the Catholic religion. The Proteftant leaders looked to Elizabeth as the great protectrefs of their principles, and fhe took every opportunity to undermine the influence of Mary, and involve her in difficulties; not only on account of her predilection for the French alliance with her country, but becaufe Elizabeth regarded her as a perfonal rival and a claimant of her crown. On this and on various other accounts, though the reception of Mary was for the moment highly flattering, and feemed to denote an univerfal fpirit of loyalty, abundant fources exifted of impending difturbances. The commencement of her adminiftration was prudent and moderate. Although the zeal of the reformers infulted her religion, fhe would not liften to the violent counfels of the popifh faction, but gave her confidence entirely to the Proteftants. She repreffed the outrages of the banditti of the borders, and made a progrefs into the north, with the view of remedying the diforders there. Her appearance gave fo much alarm to the powerful earl of Huntley, that he took up arms, and Mary, with her minifters who attended her, was brought into great danger, from which fhe was refcued by the loyalty of fome Highland clans. The earl was afterwards defeated and flain by Mary's natural brother, the earl of Murray. Her people were now anxious that fhe fhould enter upon a fecond marriage, and various matches were propofed to her by foreign potentates. Her choice fell upon her kinfman Henry Stuart, lord Darnley, fon of the earl of Lennox, a youth who, befides a fine perfon, did not poffefs a fingle valuable qualification. This match was oppofed by many of her powerful nobles, but through the addrefs of the queen, the confent of the nation in general was obtained, and the union took place in 1565. She proclaimed her hufband king, and commanded that all writs fhould run in their joint names, and fhe began to devife means to revenge herfelf on thofe who had oppofed her marriage. Thefe were the chiefs of the Proteftant party; in her own mind fhe would have exercifed clemency towards them, but the folicitations of the French court, then engaged in a league with Spain to extirpate herefy, induced her to change her intentions. She called a parliament, in which their attainder, and fome meafures in favour of the Catholic religion in Scotland, were to be propofed, when a circumftance occurred, which for a time took the whole poffeffion of her mind. David Rizzio, the fon of an Italian mufician, had accompanied the Piedmontefe ambaffador to Scotland, and gained admiffion into the queen's family by his mufical talents. He foon fhared much of her favour, and was raifed to the office of her French fecretary. This good fortune rendered him fo arrogant and infolent, that he was regarded by the nobles with all the ill-will ufually attending a worthlefs favourite. Rizzio affifted Darnley in engaging the affections of the queen; and very foon after the marriage he became his rival, and took fuch liberties with the queen, as paffed all bounds of prudence and decorum, and Darnley refolved to get rid of him. At the fame moment, fome men of rank, who imputed to Rizzio the queen's enmity to the exiled nobles, concurred in the project for his deftruction. A confpiracy was formed for effecting the purpofe, and a band of armed ruffians took poffeffion of the gates of the palace of Holyrood houfe, while the king, with fome other perfons, and lord Ruthven in complete armour, entered the chamber where Mary was at fupper with the countefs of Argyle and Rizzio. The unhappy victim clung to the queen for protection; but her entreaties and fupplications were of no avail; he was dragged from her prefence, and murdered in the next apartment. This favage deed, aggravated by the queen's fituation, who was far advanced in pregnancy, could not be forgiven. From this hour, Mary took no pains to conceal her hatred of her hufband, whom fhe treated with every mark of averfion and contempt, nor

nor did the birth of a ſon, afterwards James VI. of Scotland, and the firſt of that name in England, produce a reconciliation. She, however, ſoon transferred her affection from Rizzio to Hepburn, earl of Bothwell, a potent nobleman, who had ever evinced an attachment to her cauſe, and had been a principal inſtrument of reſcuing her from the power of the conſpirators, who would willingly have ſacrificed her as well as her paramour. He, neglected and deſpiſed by every one, was glad to live in ſolitude; and in the beginning of 1567, he was ſeized with a diſorder, which brought his life into danger, and which was attributed by ſome perſons to poiſon. When he was getting better, Mary paid him a viſit at Glaſgow, in which ſhe put on an appearance of the greateſt kindneſs and affection, and he conſented to accompany her to Edinburgh. Here ſhe attended him with the aſſiduity of a tender wife, and ſlept two nights in the chamber under his apartment. But on the next day ſhe left him to be preſent at a maſque in her palace, and at two o'clock the following morning the houſe was blown up with gunpowder, and the king's dead body was found in an adjacent field. To Bothwell and the queen this foul deed was imputed, and the late king's father inſiſted that the former ſhould be brought to trial, but no perſon appearing as his accuſer on the day appointed, he was acquitted. Within a week from this acquittal, Bothwell, at a public entertainment, openly avowed his intention of marrying the queen; the perſons preſent, people of the higheſt rank in the country, applauded his determination, and ſubſcribed a paper expreſsing their conviction of his innocence with reſpect to the murder, and recommending him as huſband to the queen. The ſentiments of the nation by no means correſponded with the declaration of theſe mean ſpirited nobles, and the projected union was generally looked upon with deteſtation. Bothwell reſolved to bring it to effect with violence. As the queen was proceeding from Edinburgh to Stirling, to viſit her infant ſon, he ſuddenly appeared on the road with a large body of horſe, diſperſed her ſlender train, and ſeizing her perſon with a few courtiers, conveyed them to his caſtle at Dunbar. That this was a preconcerted plan, done with the conſent of the queen, there never was a doubt in any one's mind. On the 5th of May, and within a few weeks of her huſband's murder, the marriage was conſummated; and from this period, Bothwell, without the title of king, poſſeſſed the whole power of the crown; no acceſs was permitted to the queen except through his creatures, and he made a deſperate attempt to get the perſon of the young prince into his hands, but without ſucceſs. Theſe tranſactions excited a general indignation in foreign countries, and rendered the Scottiſh name odious, till at length the nobles of the land redeemed their credit by a determined and practical patriotiſm in defending the prince. They collected an army, and declared againſt Bothwell, who, with the queen, retired to Dunbar, and alſo raiſed troops. To avoid the conſequences of a battle, Mary was obliged to accept the condition of diſmiſſing Bothwell from her preſence, and ſurrendering herſelf to the confederates. Bothwell took his leave, and rode from the field, juſt one month after his marriage, and ſhe never ſaw him afterwards. She was, after this, received with reſpect by the nobles; but the ſoldiers and common people could not be prevented from expreſſing their feelings in the moſt opprobrious terms. A ſtandard was held before her, on which was painted the corpſe of the late king, with the infant prince kneeling, and uttering the words "Judge and revenge my cauſe, O Lord." She was conducted to Edinburgh, as a ſpectacle of ſhame through the ſtreets, aud ſympathy for her condition was loſt, in horror of her real or imputed crimes. She was ſoon after obliged to reſign the crown, which was placed on the head of the prince, Murray being appointed regent during the minority. Mary was now thrown into priſon, from which ſhe contrived to make her eſcape, and after an unſucceſsful attempt to regain her power, ſhe reſolved to throw herſelf upon the generoſity of her rival, Elizabeth, and haſtily embarking in a fiſhing-boat, ſhe landed at Workington in Cumberland, whence ſhe was reſpectfully conducted to Carliſle. The queen of England was at a loſs to know how to treat a foreign princeſs expelled from her country, and accuſed by her own ſubjects, who was likewiſe regarded by the Catholic party as the rightful claimant of the Engliſh crown. She determined, however, to take advantage of the incident, and at leaſt to detain her as a ſort of ſtate priſoner. Mary propoſed to ſubmit her cauſe to the cognizance of her ſiſter-queen; the offer was accepted, as implying a kind of judicial ſuperiority in the latter, and affording the occaſion of keeping Mary in a diſtant confinement for an indefinite period. By the requiſition of Elizabeth, the regent Murray was induced to appoint commiſſioners to ſupport his cauſe, Mary did the ſame on her part; and Elizabeth nominated three perſons of diſtinction to hear both parties. The conferences were opened at York, whence, after a time, they were removed to Weſtminſter. The regent directly accuſed Mary of being acceſſory to the murder of her huſband, of which, it was ſaid, proofs were adduced in her own hand-writing; but after a variety of delays and ſubterfuges, by which both queens ſeemed inclined to ſtifle inquiry, the regent, who had come in perſon to England, was diſmiſſed without either approbation or cenſure, while Elizabeth determined to ſupport his party in Scotland, and Mary remained in cuſtody. She hoped to regain her liberty by means of a marriage with the duke of Norfolk. Elizabeth was kept in ignorance of the deſign, while it was communicated to the courts of France and Spain, who highly approved it. When the fact was diſcovered by the vigilance of her miniſters, ſhe, without heſitation, committed the duke to the Tower. A rebellion in behalf of Mary's cauſe broke out in the north of England, which, though ſpeedily ſuppreſſed, excited in the mind of Elizabeth ſuch apprehenſions, that in 1570 ſhe had come to the determination of ſending back the captive to her own country, under the cuſtody of the regent. This plan was defeated by the murder of that nobleman, an event that revived the hopes of Mary's friends and adherents in Scotland, and cauſed great confuſion in that country. The duke of Norfolk was liberated from confinement, and, carrying on a correſpondence with Mary, was ſeduced, in 1571, into a conſpiracy, which coſt him his life. Mary, whoſe place of confinement had been the caſtle of Tutbury, was, on account of ill health, ſuffered to go to Buxton. About this period the earl of Morton fell into the power of his enemies in Scotland, and was tried and convicted of having a ſhare in the late king's death. By his dying confeſſion, he admitted that he had been informed by Bothwell of the conſpiracy, but that finding the queen was the author of it, he forebore to take any ſteps to reveal it. In 1584, there were other plots contrived to effect Mary's eſcape, by one of which the Engliſh nation was thrown into ſuch alarms for the ſafety of the queen and the Proteſtant religion, that a meaſure was adopted which may be conſidered as the fore-runner of Mary's fate. This was an aſſociation, by which the ſubſcribers bound themſelves, by the moſt ſolemn oaths, to defend queen Elizabeth from all enemies, foreign and domeſtic. The unanimity with which this aſſociation was entered into by all ranks of people alarmed Mary, who ſubmitted herſelf, with great apparent humility, to the queen's diſpoſal, though ſhe was almoſt at the ſame inſtant detected in ſecret correſpondence with the Engliſh Catholics. She had hitherto been under the care of the earl of Shrewſbury, who had diſcharged the truſt repoſed in him during fifteen years with reſpect and lenity towards the unfortunate captive, and with great integrity towards his employers. She was now committed to the cuſtody of two keepers of inferior rank and harſh diſpoſitions, *viz.* ſir Drue Drury, and ſir Amias Paulet. Elizabeth, in the mean time, obtained an aſcendancy over the councils of the young king of Scotland, and engaged him in a league for the protection of the Proteſtant religion, now endangered by the power and bigotry of Philip II. of Spain.

A new conſpiracy againſt the life of the queen of England afforded her miniſters an opportunity of involving Mary as an accomplice in it, and letters aſſerted to be her's were produced, which proved, or which were thought to prove, her participation in the deſign of aſſaſſinating Elizabeth. The circumſtances, if founded in fact, were no doubt greatly exaggerated, the zeal of the nation was inflamed to the higheſt degree, and the puniſhment of the great culprit was loudly called for. The court, being backed by the people at large, reſolved to proceed to the extremity it had long meditated. The papers of the Scottiſh queen and her domeſtics were ſeized, and ſhe herſelf was conveyed a *cloſe* priſoner to Fotheringay-caſtle. Under the cover of that phraſe, "cloſe impriſonment," there is no treatment, however ſevere, that has not been practiſed by gaolers, and ſanctioned by their employers. Preparations were made for trying her publicly, and in October, 1586, a commiſſion was opened for the purpoſe. At firſt ſhe refuſed to plead, uſing the obvious and valid arguments, that ſhe was a foreigner, and a ſovereign in her own right: that ſhe owed no allegiance to the laws of a kingdom in which ſhe had been treated only as a captive, and from which ſhe had received no protection. Her objections being over-ruled, ſhe was perſuaded or threatened into a conſent to plead. She made her defence with great dignity of mind, and ſolemnly diſclaimed the leaſt concurrence in any deſign to take away the queen's life; ſhe was, however, declared guilty of being an acceſſary to Babington's conſpiracy. Though the trial was conducted in a manner which would have been illegal, even if ſhe had been a ſubject of England, and though no certain proof could be made out againſt her, ſhe was, to the aſtoniſhment of Europe, condemned to ſuffer death. The fair heroine received her ſentence with fortitude and compoſure, and when the earls of Shrewſbury and Kent were introduced to inform her that ſhe muſt prepare for death next morning at eight o'clock, ſhe ſeemed in nowiſe terrified, though ſomewhat ſurpriſed with the intelligence. She ſaid with a cheerful and ſmiling countenance, that ſhe did not think the queen would have conſented to her death, or have executed the ſentence againſt a perſon not ſubject to the laws and juriſdiction of England: "But as ſuch is her will," ſaid ſhe, "death, which puts an end to all my miſeries, ſhall be to me moſt welcome; nor can I eſteem that ſoul worthy the felicities of heaven, which cannot ſupport the body under the horrors of the laſt paſſage to theſe bliſsful manſions." On the evening before her execution on the ſucceeding morning, ſhe prepared herſelf with religious ſolemnity and perfect reſignation. She called in all her ſervants and drank to them: they pledged her, in order, on their knees; and craved her pardon for any paſt neglect of their duty: ſhe even deigned, in return, to aſk pardon for her offences towards them, and a plentiful effuſion of tears attended this laſt ſolemn farewel and exchange of mutual forgiveneſs. She then diſtributed among them her money, her jewels, and her clothes, according to their rank and merit. She wrote her will with her own hand, conſtituting the duke of Guiſe her principal executor, and to the king and queen of France ſhe recommended her ſon, provided he ſhould prove worthy of their eſteem. At her uſual time ſhe went to bed, ſlept ſome hours, and then riſing, ſpent the reſt of the night in prayer. Having foreſeen the difficulty of exerciſing the rites of her religion, ſhe had taken the precaution to obtain a conſecrated hoſt from the hands of pope Pius, and ſhe had reſerved the uſe of it for this laſt period of her life. By this expedient, ſhe ſupplied, as much as ſhe could, the want of a prieſt and confeſſor, which was refuſed her by the bigotry of the earls of Shrewſbury and Kent, who would have forced upon her the dean of Peterborough, rather to enter upon controverſial topics, than to afford her the conſolation that her ſituation required. Towards the morning ſhe dreſſed herſelf in very elegant attire, and met the awful ceremony with a dignity and mildneſs of diſpoſition that affected every beholder, except, perhaps, the dean of Peterborough, who inſulted her with his exhortations, and the two noble earls, who ſeemed deſirous of refuſing every requeſt, however reaſonable for her to aſk, and for them to grant. Her behaviour at this awful criſis has furniſhed matter for all the deſcriptive eloquence of hiſtory: it was indeed calm, magnanimous, and pathetic, in a ſupreme degree. After due preparations, ſhe laid her head on the block, and firmly received the fatal ſtroke. She died in her forty-fifth year, after a captivity of almoſt nineteen years. She was a woman of great accompliſhments both of body and mind, natural as well as acquired, but unfortunate in her life, and, during one period, very unhappy in her conduct. An enumeration of her qualities might carry the appearance of panegyric; an account of her conduct muſt, in ſome parts, wear the aſpect of ſevere ſatire and invective. Her misfortunes, the ſolitude of her long and tedious captivity, and the perſecutions to which ſhe had been expoſed on account of her religion, had wrought her up to a degree of bigotry during her later years, and ſuch were the prevalent ſpirit and principles of the age, that it is the leſs wonder if her zeal, her reſentment, and her intereſt uniting, induced her to give conſent to a deſign which conſpirators, actuated only by the firſt of theſe motives, had formed againſt the life of Elizabeth. Mary wrote "Poems on various occaſions, in the Latin, French, and Scotch languages:" "Conſolations of her long impriſonment, and royal advice to her ſon:" "A Copy of Verſes, in French, ſent with a diamond ring to queen Elizabeth:" "Genuine Letters of Mary, queen of Scots, to James, earl of Bothwell." Beſides theſe, there are many other of her epiſtles to queen Elizabeth, Cecil, and other diſtinguiſhed characters preſerved in the Cottonian and Aſhmolean libraries. Robertſon's Hiſt. of Scotland. Hume's Hiſt. of England.

Mary, *St.*, in *Geography*, an iſland in the Eaſt Indian ſea, near the N.W. coaſt of the iſland of Borneo. N lat. 6° 30′. E. long. 114° 30′.—Alſo, one of the Scilly iſlands. N. lat. 49 57′. W. long. 6° 17′. See Scilly *Iſlands.*—Alſo, an iſland in the Indian ſea, ſeparated from the E. coaſt of Madagaſcar, by a ſtrait about three leagues wide; the iſland is about 15 leagues long, and from two to three wide, amidſt rocks, on which is found ſome beautiful white coral; on the E. coaſt is found ambergris, uſed by the inhabitants in their ſacrifices to the memory of their anceſtors. The interior abounds with gentle hills, innumerable brooks, and ſprings of freſh water The inhabitants, who pretend to be the deſcendants of Abraham, call the iſland "Noſſi Ibrahim." The ſoil is fertile, and produces rice, ſugar-canes, legumes of different kinds, pine-apples, tobacco, &c. The air is inſalubrious, and rain frequently occurs and ſometimes

times continues, without intermiffion, for a fortnight. S. lat. 16° 40′. E. long. 50° 30′.—Alfo, one of the Shiant iflands, among the Weftern iflands, near the S.E. coaft of Lewis, in Scotland, about feven miles in circumference; 22 miles S. of Stornaway.—Alfo, one of the Azores iflands. N. lat. 37°. W. long. 25° 6′.—Alfo, a county of Maryland, on the peninfula between Patowmac and Patuxent rivers, 39 miles long, and 15 broad, containing 13,699 inhabitants, of whom 6399 are flaves.—Alfo, a poft-town and port of entry of Georgia, fituated on St. Mary river, a few miles from its mouth. The town is fmall, and its trade is inconfiderable; 129 miles S. of Savannah. N. lat. 30° 45′. W. long. 79° 12′.—Alfo, a river which forms part of the fouthern boundary line of the Upper States; and in part divides Georgia from Eaft Florida. It rifes in the great Okafonoka or Ekaufanoga fwamp, which extends S. into E. Florida. It is thought to be that which is called May river, difcovered by John Ribalt in 1562. Between this and Naffau river lies the low even coaft of Amelia ifland. The harbours of both rivers are fpacious, but St. Mary's is the fafeft; it has nine feet of water at low fpring tides, runs a courfe of 150 miles, enters the ocean between the points of Amelia and Talbert's iflands, in N. lat. 30° 44′, and is navigable for veffels of confiderable burden for 90 miles. Its banks afford immenfe quantities of fine timber, fuited to the Weft India market.—Alfo, a branch of the Miami, which runs into lake Erie.—Alfo, a river of Nova Scotia, which runs into the fea, N. lat. 45° 5′. W. long. 61 .—Alfo, a river of America, which runs from lake Superior to lake Huron; on which are two forts. N. lat. 46° 22′. W. long. 84° 24′.—Alfo, a port on the S. fide of the bay of Fundy.—Alfo, a fmall ifland, called "Bates Ifland," in the German fea, near the E. coaft of England, and county of Northumberland; fix miles N.N.W. of Tynemouth. N. lat. 55° 6′. W. long. 1° 11′.

Mary's, *St.*, *Bay*, a bay on the S. coaft of Newfoundland. N. lat. 57°. W. long. 54° 20′.—Alfo, a bay of the Atlantic, on the coaft of Africa. S. lat. 13° 12′.—Alfo, a bay on the W. coaft of Nova Scotia, E. of the bay of Fundy.

Mary, *St.*, *Cape*, the moft fouthern promontory of Brazil.—Alfo, the point of land which forms the N. fide of the mouth of La Plata river, in Paraguay, or La Plata, in South America. S. lat. 35° 14′. W. long. 55° 32′.—Alfo, the S.E. headland at the mouth of Placentia bay, Newfoundland.

Mary, *St.*, *Falls of*, a cataract in St. Mary's river, between lake Superior and lake Huron, confifting not of a perpendicular defcent of water, but of a rapid, which continues near three quarters of a mile, over which canoes, well-piloted, might pafs. Thefe falls fupply immenfe quantities of fifh, which are commodioufly caught by dipping nets at the bottom of the falls.

Mary's, *St.*, *Inlet*, a bay on the coaft of Georgia, at the mouth of the river St. Mary. N. lat. 30° 56′. W. long. 81° 40′.

Mary's, *St.*, *Iflands*, a clufter of fmall iflands in the gulf of St. Lawrence, near the S. coaft of Labrador. N. lat. 50° 20′. W. long. 60°.

Mary's, *St.*, *Keys*, rocks on the S. coaft of Newfoundland. N. lat. 46 47′. W. long. 53° 55′.

Mary's, *St.*, *Key*, a fmall ifland in the gulf of Mexico, near the coaft of Florida. N. lat. 30° 11′. W. long. 89° 12′.

Mary, in *Heraldry*, *Knights of St. Mary*, is a name by which feveral orders of knighthood are diftinguifhed. As, the *Virgin Mary* and St. Blaife. See St. Blaise. *St. Mary* of the Thiftle. See Thistle. *St. Mary* of the Conception. See Conception. *St. Mary* of the Elephant. See Elephant. *St. Mary* and Jefus. See Jesus. *St. Mary* of Loretto. See Loretto. *St. Mary* of Mount Carmel. See Carmel. *St. Mary* of the Teutonics. See Teutonic, &c.

MARYBONE, or St. Mary le Bone, a large parifh at the north-weftern extremity of London, and now conftituting a populous portion of this capital. It was anciently called Tiburn, from its fituation near a fmall bourn or rivulet, which was formerly named Aye-brook or Eye-brook. When the feite of the church was changed to a place near the brook, it appears to have gained the appellation of St. Mary-at-the-Bourn, of which its prefent name is a corruption. The parifh is fituated in the hundred of Offulfton, and county of Middlefex; is eight miles and a quarter in circumference; and contains about 2500 acres, whereof nearly half is occupied by buildings, and the remainder, extending weftward to Kilbourn turnpike, and northward to Primrofe-hill, is grafsland, except a few acres appropriated to market gardeners. The foil on the north fide of the parifh is clay, and on the fouth a fine gravel. The manor of Tybourn was an ancient demefne of the crown; and the manor-houfe was ufed as a palace: this manfion was pulled down in the year 1791, and Devonfhire Mews built on the feite. In the vicinity was a well known place of entertainment called Marybone-gardens, which were opened before the year 1737, for public breakfafts, and evening concerts with exhibitions of fire-works, &c. The gardens were fhut up in 1778; and the feite is now occupied by Beaumont-ftreet, and part of Devonfhire-ftreet and Devonfhire-place. Marybone-park, a part of the ancient royal demefne, and fince called Marybone-park farm, contains 543 acres, according to an actual furvey made in the year 1794, under the direction of John Fordyce, efq. furveyor-general of the crown lands. About two-thirds of this diftrict are in the parifh of Marybone, and the remainder in that of Pancras. A new fcheme has been recently propofed to lay it out for villas, rides, ftreets, &c. A canal, (called the Regent's) from Paddington to the Thames, is to pafs through it. An act of parliament for this purpofe was obtained in the year 1812. It was alfo defigned to build extenfive barracks here; but this fcheme having been feverely and juftly reprobated in fome of the public journals, it is relinquifhed. Since Marybone has been in fome degree incorporated with London, feveral fplendid manfions have been erected by the nobility, and other perfons of opulence within this parifh. The moft remarkable are, the earl of Aldborough's in Stratford place; Montague houfe, in Portman fquare; Manchefter-houfe; Harcourt-houfe; Chandos-houfe; Foley-houfe, which might have been added to the lift, is now taken down, and the ground let to build a wide ftreet from Portland-place fouthward. In Duchefs-ftreet, Thomas Hope, efq. has a fplendid manfion, containing a large and valuable collection of ancient vafes, fculpture, paintings, &c. The late fir Francis Bourgeois had a handfome houfe in Charlotte-ftreet, which was filled with a large and choice collection of pictures by the moft eminent mafters. The whole of thefe are bequeathed to Dulwich college, in Kent, where a large and appropriate gallery is now building for their reception, from the claffical defigns of John Soane, efq. profeffor of architecture to the Royal Academy. Attached to which is a maufoleum, to contain the remains of the late fir Francis, and alfo thofe of his friend Noel Defenfans, efq.

In the year 1400, bifhop Braybrooke granted a licence to take down the old church of Tybourn, and to build a new church of ftones or flints in a more eligible fituation. This edifice, called Marybone church, being, through length of time, in a ruinous condition, was taken down in the year 1741, when the prefent ftructure was erected on the feite; but it is very fmall and ill fuited to the prefent population. There are, however, eight private chapels in the parifh, belonging to the eftablifhment of the church of England; *viz.* Oxford chapel, built before 1739; Portland chapel, 1766; Bentinck chapel, 1772; Welbeck chapel, 1774; Portman chapel, 1779; Quebec chapel, 1788; Margaret-ftreet chapel, firft ufed as a place of worfhip of the eftablifhed church in 1789; Brunfwick chapel was built about the year 1795. The parifh alfo contains feveral chapels appropriated to perfons of different religious profeffion: among which are two for Roman Catholics; one belonging to the Greek church; and one for the Wefleyan Methodifts.

At the beginning of the laft century, Marybone was a fmall village, nearly a mile diftant from any part of the metropolis. In the year 1715, a plan was formed for building Cavendifh-fquare, and feveral ftreets on the north fide of Tybourn road. In 1718, the ground was laid out, the circle for the centre inclofed, and furrounded with a parapet-wall and palifadoes. The duke of Chandos took the whole north fide, intending to build a magnificent manfion, of which the houfes belonging to the earls of Hopetown and Gainfborough were to have been the wings. Lord Harcourt and lord Bingley took fome ground on the eaft and weft fides, and the reft was let to builders; but the failures of the South-fea year put a ftop to the improvements, and the fquare was not completed for feveral years. As an inducement to the builders to perfevere, a chapel and market were projected; and they were both finifhed in 1724, though the market was not opened till 1732. The houfes on the north fide of Tybourn road were completed in 1729, and it was then called Oxford-ftreet. Maitland, whofe work was publifhed in 1739, fays, there were in his time 577 houfes in Marybone parifh. Portman-fquare was begun about 1764, and Portland-place about 1770. Manchefter-fquare, which had been begun in 1776, by the building of Manchefter-houfe, was finifhed in 1788. From that time to the commencement of the prefent war, the buildings rapidly increafed. In the return under the population act of 1800, this parifh is ftated to contain 7764 houfes, occupied by 63,982 perfons. The prefent number of houfes muft exceed 8330. The progreffive increafe in the population appears in the regifters of baptifms and burials, which were, on an average,

Years.		Average of Baptifms.		Average of Burials.
From 1680 to 1689	-	13	-	34
1712 — 1721	-	35	-	89
1730 — 1739	-	173	-	313
1770 — 1774	-	798	-	930
1780 — 1784	-	1122^{3}	-	1263$\frac{4}{5}$
1790 — 1794	-	1697^{4}	-	1419^{4}
1795 — 1799	-	1784$\frac{1}{5}$	-	1555$\frac{3}{5}$
1805 — 1809	-	1908$\frac{1}{5}$	-	1805

Among the many eminent perfons buried in this parifh, we fpecify the following names: Humphrey Wanley, antiquary; James Figg, the celebrated prize-fighter, rendered famous by being a fubject for Hogarth's pencil; James Gibbs, architect; Archibald Bower, hiftorian, &c.; Edmund Hoyle, author of the treatife on Whift; John Michael Ryfbrack, ftatuary; William Guthrie, hiftorian and geographer; James Fergufon, aftronomer; Allan Ramfay, portrait-painter; Mark Anthony Jofeph Baretti, linguift; John Dominick Serres, marine-painter; Stephen Storace, an eminent mufical compofer; William Cramer, mufician; Francis Wheatley, artift; George Stubbs, artift; admiral fir Richard King, baronet; Alexander Dalrymple, geographer, &c.; Thomas Holcroft, author of various works; William Henry Cavendifh, duke of Portland. Very numerous entries occur in the regifters of marriages, baptifms, and burials, relating to families of the firft rank. A charity-fchool was inftituted in this parifh in 1750, for clothing, inftructing, and apprenticing the children of the induftrious poor. On the north fide of Oxford-road, near Stratford-place, were fome ancient conduits belonging to the city of London: near them ftood the lord mayor's banqueting-houfe, where the city officers were accommodated when they went to view the conduits; it was pulled down in 1737, and the fprings were arched over.

This parifh is governed by a felect veftry, and is extremely well regulated, for which it is much indebted to the late bifhop Harley, who was many years curate here, and exerted his intereft in procuring the acts of parliament by which the regulations are confirmed.

The public place of execution for criminals convicted in the city of London and county of Middlefex, was formerly in this parifh, at the end of Park-lane, near Tybourn-turnpike. For further particulars refpecting this part of London, fee PADDINGTON and PANCRAS. Lyfons's Environs of London, vol. iii. and Supplement to ditto, 1812, 4to. Malcolm's "Londinium Redivivum," vol. iv. 4to.

MARYBOROUGH, a poft-town of Ireland, in the Queen's county and province of Leinfter. It is fituated on the river Barrow, and is the affizes town of the county. It is not large; but in its neighbourhood is manufactured a great quantity of ftuffs, ferges, druggets, and other woollen goods. Maryborough received its name from queen Mary I. in whofe reign the county was made fhire ground: it had, before the Union, the privilege of being reprefented in parliament; and it ftill retains its peculiar magiftrates. It is 40 miles S.W. from Dublin. Carlifle. Beaufort.

MARYGOLD, in *Botany*. See CALENDULA.

The leaves of this plant appear to be of greater virtue than the flowers, to which many exploded virtues have been afcribed: their expreffed juice has been given in dofes of two or three ounces, or more, as an aperient; and is faid to loofen the belly, and promote the natural fecretions in general. Lewis.

MARYGOLD, *African*. See TAGETES.

MARYGOLD, *Corn*. See CHRYSANTHEMUM.

MARYGOLD, *Fig*. See MESEMBRYANTHEMUM.

MARYGOLD, *French*. See TAGETES.

MARYGOLD, *Marfh*. See CALTHA.

MARYGOLD, *Zoophyte*, in *Natural Hiftory*, the name of a fpecies of fea-animal, of a very beautiful kind, and of the nature of thofe commonly called *zoophytes*, or plant-animals, by the old naturalifts. In St. Lucy's parifh, in Barbadoes, there is a cave, in which is a bafon of very clear falt water: and in the midft of this bafon lies a ftone, which has been for many years found to be the habitation of a great number of animals of this fpecies.

The ftone is always covered with water; and from fmall holes in its fides, in feveral parts, there appears at all times of the year a number of creatures reprefenting the flowers of fome of the radiated plants, and particularly of the common marygold: they are yellow, and feem compofed of a very great number of petals. Thefe, in their natural ftate, are all regularly and beautifully expanded; but as foon as any thing difturbs them, if it be only the motion of of a ftick, that comes within three or four inches of them, they in an inftant clofe all the leaves up together, and the whole body, flower, ftalk and all, is retracted back into the hole of the ftone; but if the water be left a few minutes undifturbed again, they will appear, and expand themfelves in the former manner.

When they are nicely obferved, there is a yet farther refemblance of a flower in their ftructure; for there arife from the centre of the body certain oblong bodies, which very naturally refemble the ftamina arifing from the centre of a flower; but thefe have evidently the powers of animal limbs; for they no fooner appear, but they dart themfelves about to the verge of the flower in feveral directions, and are plainly bufied in fearch of prey.—They are compofed of feveral joints, and the creature often makes them meet in the manner of a forceps, to lay hold of any thing it pleafes. Thefe parts, however, feldom appear thus exerted any long time together, but are, after a time, received back into the body.

Thefe arms may eafily be conceived to be of ufe to draw in the prey within the compafs of the body of the animal; and as foon as it is there, the fame contraction of the feveral rays which ferves them to efcape danger, and bury themfelves in the cavity of the ftone, will alfo ferve to hold faft the prey till the creature has fed on it.

Befide thefe large yellow radiated zoophytes, the top of the ftone ufually affords a number of others of a blue colour, which ftand among a fort of veficles of water-bladders, difpofed like clufters of grapes. Philof. Tranf. N° 470. p. 591.

MARY-GREY, in *Geography*, the name of a tolerably high mountain in the county of Tyrone, Ireland, between Omagh and Strabane. The road paffes between this mountain and Baffy Beil, another infulated mountain of confiderable height. Beaufort.

MARYKIRK, a town on the S. coaft of the ifland of Sanday. N. lat. 59° 6′. W. long. 2° 27′.

MARYLAND, one of the United States of America, lying between 37° 56′ and 39° 44′ N. lat. and 0° and 4° 30′ W. long. 134 miles in length and 110 in breadth, or 14,000 fquare miles in fuperficial meafure, one-fourth of which is water. This ftate is bounded N. by Pennfylvania, E. by Delaware ftate and the Atlantic ocean, and S. and W. by Virginia. It is divided into 19 counties, 11 on the weftern, and eight on the eaftern fhore of Chefapeak bay, as in the following table.

Counties.		No. Inhab. in 1790.	No. Inhab. in 1800.	No. Slaves in 1790.	No. Slaves in 1800.	Chief Towns.
Weftern Shore.	Hartford - - -	14,976	17,626	3:417	4,264	Bellair
	Baltimore - - -	38,937	59,030	7,132	9,673	Baltimore
	Ann-Arundel - -	22,598	22,623	10,130	9,760	Annapolis
	Frederick - - -	30,791	31,423	3,641	4,572	Fredericktown
	Allegany - - -	4,809	6,303	258	499	Cumberland
	Wafhington - - -	15,822	18,850	1,286	2,200	Elizabethtown
	Montgomery - -	18,003	15,058	6,030	6,288	
	Prince-George - -	21,344	21,185	11,176	12,191	Marlborough
	Calvert - - -	8,652	8,297	4,305	4,101	St. Leonard
	Charles - - -	20,613	19.172	10,085	9,558	Port Tobacco
	St. Mary's - - -	15,544	13,699	6,985	6,399	Leonardstown
Eaftern Shore.	Cecil - - -	13,625	9,018	3,407	2,103	Elkton
	Kent - - -	12,836	11,771	5,433	4,474	Chefter
	Queen Ann - -	15,463	14,857	6,674	6,517	Centreville
	Caroline - - -	9,506	9,226	257	1,865	Denton
	Talbot - - -	13,084	13,436	4,777	4,775	Eafton
	Somerfet - - -	15,610	17,358	7,070	7,432	Princefs Ann
	Dorchefter - - -	15,875	12,346	5,337	4,566	Cambridge
	Worcefter - - -	11,640	16,370	3,836	4.398	Snow Hill
Columbia Diftrict - -			8,144		2,072	Wafhington
Total		319,728	349,692	103,036	107,707	

Each of the counties fends four reprefentatives to the houfe of delegates, befides which the city of Annapolis and town of Baltimore fend each two. Annapolis is the capital of the ftate: but Baltimore is more populous and of greater commercial importance. The number of inhabitants in this latter town, according to the cenfus of 1800, was 26,514, of whom 2843 were flaves. The bank eftablifhed in Baltimore, with a capital of 300,000 dollars, is called "The Maryland Bank." There is, befides, a branch of the bank of the United States. In 1796 a new bank was eftablifhed by law, with a capital of 2,000,000 dollars, called "The Bank of Baltimore." The other principal towns of this ftate are Georgetown, in which a bank has been lately eftablifhed, called "The Bank of Columbia," and alfo a college for the accommodation of about 200 ftudents, endowed chiefly by Roman Catholics of the feveral ftates, but as to education unlimited by any particular fect;—Fredericktown; Elizabethtown;—and Elkton. See each place refpectively. Chefapeak bay, which feparates this ftate into the eaftern and weftern divifions, receives a number of large rivers; from the eaftern fhore in Maryland, among other fmaller ones, it receives Pokomoke, Nanticoke, Choptank, Chefter, and Elk rivers; from the north, the rapid Sufquehanna; and from the weft Patapfco, Severn, Patuxent, and Patowmac, half of which is in Maryland, and half in Virginia. The Sufquehanna and Patowmac excepted, thefe are fmall rivers. As to the face of the country, eaftern of the blue ridge of mountains, which ftretches acrofs the weftern part of of this state, the land is generally level and free from stones. The ground is uniformly level and low in most of the counties on the eastern shore, and consequently much covered with water, except where it is intercepted by numerous creeks. The large tracts of marsh render the close of the summer and fall seasons in this part of the state sickly; spring and summer are most healthy. The soil of the good land in Maryland produces from 12 to 16 bushels of wheat, or from 20 to 30 bushels of Indian corn, *per* acre. Ten bushels of wheat, and 15 bushels of corn *per* acre, are the annual average crops in the state at large. The staple commodities are wheat and tobacco. Some cotton of inferior quality is also raised in this state, and in the interior counties, as the Uplands, considerable quantities of hemp and flax are cultivated. Two articles are said to be peculiar to Maryland, *viz.* the genuine white wheat, which grows in Kent, Queen Ann's, and Talbot counties, on the eastern shore, and which degenerates in other places; and the bright *kite's foot* tobacoo, which is produced at Elkridge, on the Patuxent, on the western shore. Among other kinds of timber are the oak, of several kinds, made into staves for exportation, and the black walnut employed for furniture. The apples are large but mealy; the peaches plentiful and good. From these the inhabitants distil cyder, brandy, and peach-brandy. The forests abound with various kinds of nuts, collectively called "Mast," and used for fattening hogs, which run wild in the woods. As to the manners of the inhabitants, Mr. Morse says that the farmers of Maryland associate very much with each other; that their manners are as polished as those of the country gentlemen in England, their minds well informed, and their intercourse free and social; their sons generally receive a liberal education, and many of them engage in the study of the law, without pursuing it as a profession. The inhabitants of Maryland, however, are not exempt from that pride, which is too general among those who are connected with and accustomed to slaves; but with their pride they blend a great degree of hospitality. Many of their women possess all the amiable, and many of the elegant accomplishments of their sex. The mines of iron ore in this state abound, and it is of superior quality; furnaces and forges are also numerous. Coal has been lately found near Baltimore, and great quantities of rye-whiskey are manufactured in this state; grist-mills are common. The trade of Maryland is principally carried on from Baltimore, with the other states, with the West Indies, and with some parts of Europe. To these places the inhabitants send annually about 30,000 hogsheads of tobacco, besides large quantities of wheat flour, pig-iron, lumber, and corn; beans, pork, and flax-seed in smaller quantities; and receive, in return, clothing for themselves and negroes, and other dry goods, wines, spirits, sugar, and other West Indian commodities. The balance is generally in their favour. The value of exports from this state in 1801 was 9,151,939 dollars. The first settlers in Maryland were Roman Catholics; besides these, there are many Protestant Episcopalians, English, Scotch, and Irish Presbyterians, German Calvinists, German Lutherans, Friends, Baptists, Methodists, Mennonists, and Nicolites or New Quakers; all of whom enjoy liberty of conscience. For the seminaries of learning in Maryland; see College.

The revenue of Maryland arises chiefly from taxes on real and personal property; and the annual expences of government are estimated at about 20,000*l.* currency. The legislature is composed of a senate and house of delegates, which are styled "The General Assembly of Maryland." The senators are elected in the following manner. On the 1st of September, every fifth year, the freemen choose two men in each county, to be electors of the senate, and one elector for the city of Annapolis, and one for the town of Baltimore. These electors, possessing the qualifications necessary for county delegates, meet at Annapolis, or any other appointed place, on the third Monday in September, every fifth year, and elect by ballot fifteen senators out of their own body, or from the people at large: nine of them residents on the western, and six on the eastern shore; all more than twenty-five years of age; residents in the state more than three years before the election; and possessing a real and personal property above the value of 1000*l.* The senate may originate any bills, except money bills, to which they can only give their assent or dissent. The president of the senate is chosen by ballot. The house of delegates is composed of four members for each county, chosen annually the first Monday in October: the city of Annapolis and town of Baltimore, as we have already observed, send each of them two delegates. The qualifications of a delegate are, full age, one year's residence in the county where he is chosen, and real and personal property above the value of 500*l.* Both houses choose their own officers, and judge of the election of their members; a majority of each is a quorum. The election of senators and delegates is *vivâ voce*, and sheriffs the returning officers, except in Baltimore town, where the commissioners superintend the elections, and make returns. The stated session of the legislature is on the first Monday in November. The qualifications of a freeman are, full age, a freehold estate of fifty acres of land, and actual residence for a year in the county where he votes, and property in any part of the state to the value of 30*l.* The governor is appointed on the second Monday in November, annually, by the joint ballot of both houses; but cannot continue in office longer than three years successively, nor be re-elected until the expiration of four years after he has been out of office. The qualifications for the chief magistracy are twenty-five years of age, five years' residence in the state, next preceding the election, and real and personal estate above the value of 5000*l.*, 1000*l.* of which must be freehold estate. A council for assisting the governor in his office, consisting of five persons above twenty-five years of age, residents in the state three years next preceding the election, and possessing a freehold of lands and tenements above the value of 1000*l.* is chosen, annually, on the second Tuesday of November by joint ballot of senators and delegates. The governor, with the advice of his council, appoints the chancellor, all judges and justices, the attorney-general, naval and militia officers, and all others, except constables, assessors, and overseers of the roads. A court of appeals is established for the final determination of all causes, which may be brought from the general court of admiralty, or of chancery. This constitution was established by a convention of delegates at Annapolis, Aug. 14, 1776.

Maryland was granted by king Charles I. to George Calvert, baron of Baltimore, in Ireland, June 20, 1632. It was called Maryland in honour of the queen, Henrietta Maria, and was the first colony which was erected into a province of the English empire, and governed by laws enacted in a provincial legislature. The first emigration, consisting of about 200 gentlemen of considerable fortune and rank, with their adherents, chiefly Roman Catholics, sailed from England in November 1632, and landed near the mouth of Patowmac river in the beginning of the following year. Calvert purchased the rights of the aborigines for a satisfactory consideration; and, with their free consent, took possession in March, 1633, of the town, which he he called St. Mary's. The foundation of this province was laid by lord Baltimore, on the broad basis of security to property and liberty in religion; Christianity being established without allowing pre-eminence to any particular sect. This wise measure soon converted a dreary wilderness into a prosperous colony. The transportation of people and of stores, during the first two years, cost lord Baltimore upwards of 40,000*l.* The freemen of the province, as an expression of gratitude, granted him, at an early period, a subsidy of fifteen pounds of tobacco on every poll. The first assembly was convened in February, 1634-5. Successive assemblies were convened in January, 1637-8, and in February, 1638-9: at which latter meeting an act passed "for establishing the house of assembly." An attempt was made by the British parliament, in 1640, to annul the charter of Maryland; but the effort failed, and Maryland remained prosperous and happy, till the intrigues of one William Cleyborne disturbed its tranquillity. In 1645, a rebellion was raised in the province; nor were peace and order restored till August, 1646. The assembly at that time, though composed chiefly of Roman Catholics, passed an act, which indicates a spirit of liberality very uncommon at that period. It recited, that the enforcement of conscience had ever been of dangerous consequence in those countries in which it had been practised. And it was enacted, "that no persons professing to believe in Jesus Christ should be molested in respect of their religion, or in the free exercise thereof, or be compelled to the exercise of any other religion, against their consent; so that they be not unfaithful to the proprietary, or conspire against the civil government. That any person molesting another in respect of his religious tenets, should pay treble damages to the party aggrieved, and twenty shillings to the proprietary; that those reproaching any with opprobrious names of religious distinction, should forfeit ten shillings to the persons injured; that any one speaking reproachfully against the blessed virgin, or the apostles, should forfeit five pounds. But blasphemy against God should be punished with death." This act passed 1649, and was confirmed in 1676, among the perpetual laws of the province. The year 1650 is remarkable in the history of Maryland for the final establishment of that constitution, which continued, with some short interruption, till the present one was adopted in 1776. In 1692, the Protestant religion was established by law in this province. In 1716, the government was restored to Charles, lord Baltimore, the then proprietary, and continued in his hands, and those of his successors, till the late revolution; when, though a minor, the proprietary's property in the lands were confiscated and the government assumed by the freemen of the province, who framed the present constitution. Maryland was the last to sign the articles of confederation, published by congress after the declaration of independence. On the 1st of March, 1781, they signed these articles, and they were thus finally ratified. Morse's Geog. vol. i.

MARYLAND *Point*, a point in the state of Maryland, formed by a bend in the Patowmac river, W. of Fort Tobacco.

MARY-PORT, a market town in the parish of Cross-Canonby, Allerdale Ward, Cumberland, England, is situated six miles distant from Workington, and 309 from London, on the banks of the river Ellen, which divides it into two parts. It was first called Mary-port, in honour of the lady of the late Humphrey Senhouse, esq. whose family have long been proprietors of the manor: the small hamlet from which the town arose, was named Ellen or Elene-foot, from its situation. This town, like many on the western coast of Cumberland, derives its origin and consequence from the coal trade: about the middle of the last century, the beach was occupied by only one house, called Valencia, and about half a score miserable huts, that served to shelter a few fishermen; but so great has been the increase of population and building, that in the year 1801 the houses amounted to 520, and the number of inhabitants was 2932. The streets are wide, and the houses neatly built. Wooden piers, with quays, have been erected on each side of the river, for the conveniency of shipping. There are now belonging to the port between seventy and eighty vessels, from 30 to 250 tons burthen. They are chiefly employed in the exportation of coal to Ireland; and in the importing of timber, flax, and iron from the Baltic. An extensive cotton manufactory has been established here, which furnishes employment for nearly 500 people. A weekly market is held on Fridays. A chapel was erected in the year 1760, and consecrated in 1763, by bishop Lyttelton. On an eminence, called the Mote-hill, at the south end of the town, is an artificial mount, the base of which is one hundred yards in circumference. It is protected by a deep ditch, which almost surrounds it.

On the north side of the Ellen, near Maryport, are the remains of a considerable Roman station, generally called Ellenborough; though the village of that name stands on the opposite side of the river at some distance. This station, in the opinion of Horsley and Warburton, was the Virosidum of the Notitia. Camden supposed it to be the Volantium; and other writers have styled it Olenacum. The fort is on a high bank, overhanging the sea, and commanding an extensive prospect of the Scottish coast. The area is a square, with four entrances, and defended by a double ditch and rampart. The numerous vestiges of antiquity and variety of inscriptions found at this station are supposed not to be equalled by those discovered at any other in Britain. The principal of these remains is a Roman altar, about five feet high, of curious workmanship, and ornamented on every side with sculptures and inscriptions.

Near the port stands Nether-hall, the seat of the Senhouse family, where the relics found at the station are chiefly preserved. This mansion was formerly called Alneburgh-hall, and Ellenborough-hall. Hutchinson's History, &c. Cumberland. Beauties of England, vol. iii.

MARYSBURGH, a township of Upper Canada, in Prince Edward county, situated at the eastern end of the peninsula, which forms the bay of Quinto, and lies open to lake Ontario on the south.

MARYSVILLE, a post-town of America, in Knox county, Tenessee; 561 miles from Washington.

MARYTOWN, a town of Scotland, in the county of Angus; 5 miles E.S.E. of Brechin.

MARYVILLE, the county-town of Blount county, in the state of Tenessee.

MARZA, a town of Sicily, in the valley of Noto, where they manufacture salt; eight miles S.S.E. of Noto. —Also, a town of Africa, in the desert of Zanhaga, inhabited by Moors, who trade with Europeans for gum, of which there are three forests near.

MARZA *el Bir*, a town of Arabia; 10 miles W. of Hali.

MARZA *Eran*, a town of Arabia; 12 miles S. of Sockia.

MARZA *Ibrahim*, a town of Arabia; five miles S. of Serrain.

MARZA *Kouf*, a town of Arabia; 35 miles S. of Mecca.

MARZA *Susa*, a town of Africa, in the kingdom of Barca; six miles N. of Curen.

MARZAGLIA, a town of Italy, in the department of the Panaro; four miles W. of Modena.

MARZANO, St., a town of Naples, in the province of Otranto; 12 miles S of Tarento.

MARZILLA, a town of Spain, in the kingdom of Navarre; 30 miles S. of Pamplona.

MARZOAN, a mountain of Egypt, near the coast of the Red sea; 15 miles from Cosseir.

MAS BAY, a bay in the North sea, on the coast of Norway. N. lat. 60 50′. E. long. 5° 30′.

MAS *d'Agenois*, a town of France, in the department of the Lot and Garonne, and chief place of a canton, in the district of Marmande, situated on the Garonne; six miles E.S E. of Marmande. The place contains 1600, and the canton 6515 inhabitants, on a territory of 82½ kiliometres, in seven communes.

MAS *d'Azil*, a town of France, in the department of the Arriege, and chief place of a canton, in the district of Mirepoix, fortified by the Protestants, but since dismantled; 25 miles W. of Mirepoix. The place contains 2482, and the canton 9969 inhabitants, on a territory of 177½ kiliometres, in 15 communes.

MAS *Cabardes, Le*, a town of France, in the department of the Aude, and chief place of a canton, in the district of Carcassonne; one mile N. of Carcassonne. The place contains 670, and the canton 6093 inhabitants, on a territory of 175 kiliometres, in 16 communes.

MASA, a town of Congo; 20 miles N.E. of St. Salvador.

MASACCIO, or TOMASO DA SAN GIOVANNI, in *Biography*, was born at Castello di San Giovanni, nel Valdarno, in the duchy of Florence. Concerning the period of his birth there has been found considerable difference among the early biographers of artists; but Baldinucci, among other evidences, produces one most completely unanswerable, which proves that he was born in 1402. This decisive proof was found in the book of the fiscal chamber of Florence, concerning the taxes or customs paid by the inhabitants of the commune of Castel di San Giovanni in 1427; in which our Tomaso gives his portion, and describes himself as being in his twenty-sixth year, and his brother Giovanni in his twenty-first.

Masaccio (for by this name Tomaso is best known) appears to have attached himself very early to the art of painting: for, at the age of 19, he was matriculated at the city of Florence as a painter; which would hardly have occurred, if he had not been at that time advanced considerably in his profession. His parents were descended of a noble stock, and had the means of enabling their son to follow with advantage the chosen object of his mind; and happy was it for the art, and the world, that for a while nothing impeded the progress of a man, whose extraordinary powers enabled him to extend the regions of art, to re-animate its almost torpid spirit, and shew to future ages how far its aid, morally and intellectually, might be cultivated for the benefit of mankind.

His father's name was San Giovanni di Mone, of the family of the Guidi. He was by profession a notary of the city of Florence; an office which, at that time, entitled him to respect, and presupposed a qualification for filling higher stations in the magistracy of that place. Finding his son Tomaso intent upon the practice of painting, he placed him as a scholar under Masolino da Panicale, who was at that time engaged in painting the chapel of the Brancacci nel Carmine. At the same time, the arts of sculpture and architecture began to revive; the former in the hands of Donatello and Ghiberti, and the latter also in those of Filippo Brunelleschi. With the works of these men Tomaso was captivated; and recognising in them the revival of the true taste observable in the antique, he attempted to apply it in painting, the inseparable companion of the sister art of sculpture. How well he succeeded his works still testify, after a lapse of 400 years, or nearly. His is the glory of forming a new epoch in the art. One hundred and fifty years had passed from the time of Cimabue to Masaccio: in that period a very considerable advance was made in the practice of painting, particularly by Giotto, the disciple of Cimabue; but still much was imperfect in design, in colour, in the imitation of the natural actions of the figure, of attitudes, relievo, and the more subtle graces of the art. Most of these Masaccio filled up the want of, and gave a more perfect imitation, as well as a better choice of nature, than any of his predecessors; overcame many difficulties, which had been stumbling blocks to them; and opened the way to those great men who succeeded him, particularly to Raphael, who seems to have been born with a soul congenial to his, and who frequently imitated, and sometimes borrowed figures from him, which he was not always able to improve. He is said to have been the first who attained that most essential point, fore-shortening the feet properly, so as to make them appear to rest flat upon the ground, and which, till his time, had not been done; probably owing to the painters taking too near a view of their figures: when looking down upon the feet, and drawing them as so seen, they would of necessity make them appear almost perpendicular. Masaccio discovered the evil of this, and taking a proper distance for his view, and a just point of sight, gave their proper effect. For this he was indebted to perspective, the principles of which were imparted to him by Brunelleschi.

He attempted to compose and draw the nude or naked figure, in more varied actions than his predecessors had dared to attempt; and though his figures are frequently imperfect, and in a style tame and insipid, yet he sometimes wonderfully succeeded, particularly in the actions of the limbs: and in his heads, and the foldings of drapery, he still upholds his station with the best.

So much skill, and so great a novelty in the art of design, soon drew him into notice; and the city of Florence wished to employ his talents. His industry keeping pace with his powers, the productions of his pencil were of course very numerous: but, alas! few now remain to testify concerning him; and of these, the greater part disfigured by time, and by ignorance, which, pretending to secure, has only hastened their destruction. Baldinucci, who wrote in 1680-90, says, that in his time, though much had been destroyed, yet sufficient remained in Florence of the works of our artist, to prove the vast extent of his study and his labour; to which he applied so fervently, that he neglected every thing which did not appertain to his art, not even collecting the money owing to him for his pictures, and being entirely negligent of his person; so that from thence he acquired the name of Masaccio, and is by that so much better known than his own, that we have thought it proper to place our account of him under it, rather than that of Tomaso da San Giovanni. He was engaged to adorn the principal churches and convents in Florence; but, after having for some time employed himself there, he was stimulated by a desire either to see the works of the ancients, those of contemporary artists, or for the benefit of his health, to travel to Rome, where his high merit was also recognised, and was called into practice. Among other works he painted, in a chapel of the church of Santa Maria Maggiore, a picture of Santa Maria della Neve, with four saints; in which was the portrait of pope Martin, painted from life, with a spade in his hand, marking out the foundations of that church; and also that of the emperor Sigismundo II. Vasari says that Michael Angelo thought it worth while to study this picture,

ture, which he praifed highly. Whilft he was thus honourably employed at Rome, he heard that his friend and protector Cofmo di Medici was again ftationed at the head of affairs at Florence, and immediately returned there. Upon his arrival he found his mafter Mafolino dead, leaving incomplete feveral pictures in the chapel of the Brancacci, the finifhing of which was immediately entrufted to Mafaccio, who, to the defigns already began by Panicale, added many others, which ftill remain monuments of his fuperior ingenuity. While he was engaged in adorning the Chiefa del Carmine, a proceffion of the hoft occurred, which gave rife to a picture in frefco (in which ftyle all his works are executed) of the peculiarities of that ceremony. This he painted over a door which led to the adjoining convent, and which is now deftroyed. In it he reprefented a great number of citizens marching in proceffion, five or fix abreaft, with a propriety and variety of action, and in fo juft a perfpective gradation of form and colour, as perfectly aftonifhed the beholders. Among others, he introduced his friends Brunellefchi, Donatello, Mafolino, Antonio Brancacci, who endowed the chapel, &c.

Thus fuccefsfully and ufefully ran the courfe of Mafaccio's life till he arrived at the age of forty-one, when he was fuddenly fnatched from his honours and the world by the remorfelefs hand of death, not without fufpicion of poifon having been adminiftered by fome envious or malignant perfon. This unhappy event caufed univerfal grief throughout the city of Florence; and Brunellefchi obferved, that, in the death of Mafaccio, the profeffors of the art had fuftained the greateft lofs which could poffibly have befallen them. The works, however, which he had fo ingenioufly wrought, remained for their inftruction; and almoft all the enlightened artifts who then lived, and who immediately followed, to carry the art to its utmoft pitch, failed not to ftudy and benefit by the fuperior qualities of this extraordinary man. Amongft them were Lionardo da Vinci, Michael Angelo, and Raphael; and when fuch men as thefe three thought his labours worthy of their ftudy, little more need be added in their praife.

MASAFFRAN, in *Geography*, a river of Algiers, which forms the boundary towards the north between the provinces of Tremecen and Titterie. It is formed by the union of feveral fmaller ftreams, and runs into the Mediterranean. N. lat. 36° 40'. E. long. 3° 13'.

MASAFUERO, an ifland in the South Pacific ocean, firft feen in 1563, and fituated W. of Juan Fernandez, both being nearly in the fame latitude, and diftant, by the globe, about 31 leagues. It is very high and mountainous, and at a diftance appears like one hill or rock; its form is triangular, and its circumference about feven or eight leagues. The fouth part, firft feen by Capt. Carteret in May 1767, when he firft made the ifland, at the diftance of 23 leagues, is much the higheft: on the north end there are feveral fpots of clear ground, which, perhaps, might admit of cultivation. In the account of lord Anfon's Voyage it is faid, that only one part of this ifland affords anchorage, which is on the N. fide, and in deep water; but Capt. Carteret faw no part where there was not anchorage. On the W. fide, in particular, there is anchorage at about a mile from the fhore, in twenty fathom, and about two and a half miles, in forty and forty-five fathom, with a fine black fand at the bottom. In the fame voyage it is alfo faid, that there is a reef of rocks running off the eaftern point of the ifland about two miles in length, which may be feen by the fea breaking over them; but this, according to Capt. Carteret's account, is a miftake, as there is no reef of rocks or fhoal running off the eaftern point, but there is a reef of rocks and fand running off the weftern fide, near the S. end of it. The author of Anfon's Voyage is alfo miftaken as to the diftance of this ifland from Juan Fernandez, and its direction, for, he fays, the diftance is twenty-two leagues, and the direction W. by S.; but Capt. Carteret found the diftance nearly one-third more, and the direction is due W., the latitude of both iflands being nearly the fame. The goats formerly mentioned in Anfon's Voyage were found by our later navigators in great abundance, and equally eafy to be caught. On the S.W. point of the ifland there is a remarkable rock with a hole in it, which affords a good mark to come to an anchor on the weftern fide, where is the beft bank of any about the place. About a mile and a half to the northward of this hole, there is a low point of land, and from this point runs the reef juft mentioned, in the direction of W. by S. to the diftance of about three quarters of a mile, where the fea continually breaks upon it. To anchor, run in till the hole in the rock is fhut in, about a cable's length upon this low point of land then bearing S. by E. ½E., and anchor in twenty and twenty-two fathom, fine black fand and fhells. There is anchorage alfo at feveral places on the other fides of the ifland, particularly off the N. point, in fourteen and fifteen fathom, with fine fand. All round the ifland there is plenty of wood and water, but they cannot be procured without difficulty; as a great quantity of ftones, and large fragments of the rock have fallen from the high land every where round the ifland, and upon this the furf breaks to fuch a degree, that a boat cannot come with fafety within a cable's length of the fhore. Mafafuero is a good place for refrefhment, efpecially in the fummer feafon. We have already mentioned the goats, and there is round the ifland plenty of fifh, which may be eafily caught; fuch as excellent coal-fifh, cavallies, cod, hollibut, and cray-fifh. King-fifhers, fharks, and feals are numerous. The latter animals yield excellent train-oil, and their hearts and plucks are good food, fomewhat refembling in tafte the hog; and their fkins are covered with very fine fur. On this ifland are many birds, and fome very large hawks. S. lat. 33° 45'. W. long. 80° 46'. Hawkefworth's Voyages, vol. i.

MASAGRAN, or MASACHRAN, a town of Algiers, in the province of Tremecen, furrounded with mud walls, and feated on the declivity of a range of hills, within a furlong of the Mediterranean; 20 miles N. of Arzew. Shaw's Travels, p. 15.

MASAIBPET, a town of Hindooftan, in Golconda; 28 miles N.N.W. of Hydrabad.

MASAN, a town of Mocaumpour; 44 miles S.W. of Mocaumpour.

MASANET, a town of Spain, in Catalonia; 17 miles S. of Gerona.

MASANI, a town of Servia; 30 miles S. of Paffarowitz.

MASARA, a town of Algiers; 12 miles N. of Conftantina.

MASARINO, in *Ornithology*, a name given by the Portuguefe in the Brazils, to a large bird of the curlew kind, approaching to the goofe in fize; and more commonly known by its Brafilian name *curicaca*.

MASARUOLO, in *Geography*, a town of Italy, in Friuli; 5 miles N. of Friuli.

MASAYA, a town of Mexico, on the weft fide of the lake of Nicaragua; 10 miles N. of Granada.

MASBATE, one of the Philippine iflands, about 90 miles in circumference, the inhabitants of which are, for the moft part,

part, free and independent. Tribute is paid by about 250 families. The chief produce of this iſland is rice. It has ſome mines, but they are not wrought. N. lat. 12° 18′. E. long. 123° 20′.

MASBOTHÆI, or MESBOTHÆI, the name of a ſect, or rather of two ſects: for Euſebius, or rather Hegeſippus, whom he cites, makes mention of two different ſects of Maſbothæans. The firſt was one of the ſeven ſects that aroſe out of Judaiſm, and proved very troubleſome to the church; the other was one of the ſeven Jewiſh ſects before the coming of Jeſus Chriſt.

The word is derived from the Hebrew שבת, *ſchabat, to reſt*, or *repoſe*, and ſignifies idle, eaſy, indolent people. Euſebius ſpeaks of them, as if they had been ſo called from one Maſbotheus, their chief; but it is much more probable that their name is Hebrew, or at leaſt Chaldaic, ſignifying the ſame thing with a Sabbatarian in our language, that is, one who makes profeſſion of keeping Sabbath.

Valeſius will not allow the two ſects to be confounded together; the laſt being a ſect of Jews before, or at leaſt contemporary with Chriſt; and the former a ſect of heretics deſcended from them. Rufinus diſtinguiſhes them in their names; the Jewiſh ſect he calls *Maſbuthæi;* and the heretics *Maſbuthæani*. The Maſbuthæans were a branch of the Simonians.

MASCALAT, in *Geography*, a town of Arabia, in the province of Oman; 240 miles W.N.W. of Oman.

MASCALL, an iſland in the bay of Bengal, near the coaſt of Aracan, about 50 miles in circumference. N. lat. 21° 40′. E. long. 92°.

MASCAR, or MASCARA, formerly *Victoria*, a town of Algiers, and capital of a province of the ſame name, ſometimes called Tremecen, from the moſt conſiderable town in it. This town is the reſidence of the bey, and the only place in the whole kingdom which, under the domination of the Turks, flouriſhes and perceptibly increaſes in proſperity. It is indeed ſmaller than Tremecen and Sherſhel; but ſurpaſſes them in beauty, and the modern appearance of the houſes, and it is daily enlarging in extent. Maſcara is ſituated in the centre of a diſtrict abounding with corn-fields, and embelliſhed with numerous ſmall villages. So late as in the time of Shaw (1732) it was but an inconſiderable place; but at preſent it has a great number of good houſes, newly erected moſques, and a ſtrong caſtle, in which the bey reſides, and is attended by a numerous and ſplendid retinue. The Bedouins in its vicinity are exempt from taxes, and merely ſerve as volunteers in caſes of neceſſity; 40 miles E.S.E. of Oran.

MASCARAIB, or MASERIB, a town of Syria, belonging to a powerful Arabian prince; three days' journey S.S.E. from Damaſcus.

MASCARDI, AUGUSTIN, in *Biography*, an Italian, was born of a good family, at Sarzana, in the territory of Genoa, in the year 1591. In early life he entered himſelf among the Jeſuits, which ſociety he quitted upon the invitation from pope Urban VIII., who made him his chamberlain, and nominated him to the profeſſorſhip of eloquence in the college of Sapienza at Rome. He died at the age of 49, and he is ſpoken of by cardinal Bentivoglio, who was his moſt intimate friend, as one of the moſt learned and eloquent perſons of his time. He was author of many works, of which, the moſt valuable is on "The Art of writing Hiſtory," firſt publiſhed in 1636, and reprinted with additions by Pirani in 1646. He publiſhed an account of the conſpiracy of Fieſco in 1629, and the work of cardinal de Retz on the ſame ſubject is only a free tranſlation of that of Maſcardi. Moreri.

MASCARENHAS, in *Geography*, a town of Portugal, in the province of Tras-los-Montes; 4 miles N. of Mirandola. See alſo *Iſle of* BOURBON.

MASCARI, a town of Sicily, in the valley of Demona; 9 miles S.W. of Taormina.

MASCARIN, one of the Gallapagos iſlands in the Pacific ocean. S. lat. 1° 12′.

MASCAT, or MASKAT, a town of Arabia, in the territories of the Imam of Oman. This is the moſt important and beſt known city in theſe territories; and hence the Imam is, by many travellers, called "king of Maſkat." It ſtands at one end of a beautiful plain, near a ſmall gulf, encompaſſed with ſteep rocks, forming an excellent harbour, in which the largeſt veſſels may find ſhelter. This harbour is likewiſe protected by forts; ſo that the city is fortified both by art and nature. Arrian calls it "Moſca," and ſpeaks of it as being, even in his time, a great emporium of the trade of Arabia, Perſia, and India. Maſkat has ever enjoyed this advantage, and even at preſent poſſeſſes a conſiderable trade. The Portugueſe made themſelves maſters of it in 1508. Two churches, one of which is now a magazine, and the other the houſe of the "wali," or governor, ſtill remain to ſhew that they were once eſtabliſhed here. About 150 years after their conqueſt of Maſkat, the Portugueſe were expelled by the Arabs, through the treacherous aid of a Banian, who had been robbed of his daughter by the Portugueſe governor. The Banians are more numerous at Maſkat than in any other city; their number amounting to 1200. They are permitted to live according to their own laws, to bring their wives hither, to ſet up idols in their chambers, and to burn their dead. At Maſkat, Europeans pay 5 *per cent.* upon imports; Mahometans, 6½; and Jews and Banians 7 *per cent.* The Imam's natural ſubjects pay 6 *per cent.* in kind, upon dates exported; and theſe are the principal article which the country affords. Maſkat is diſtinguiſhed by the ſtrictneſs of its police; ſo that a ſtranger may walk in the ſtreets any hour of the night without moleſtation. Theft is never pardoned; every perſon caught in the act either ſuffers death, or the loſs of a hand; and therefore the merchandize lies at all times ſafe in the ſtreet; 220 miles S.S.E. of Gambron. N. lat. 23° 22′. E. long. 74° 50′. Niebuhr.

MASCATLAN, a town of Mexico; 60 miles from Acapulco.

MASCAU, a town of the duchy of Stiria; 8 miles S.E. of Windiſch Weiſtritz.

MASCAUTANS, an Indian nation, inhabiting near lake Michigan, and between that and the Miſſiſippi. The number of warriors is 400.

MASCHARADA, in the *Italian Muſic*, is applied to muſic compoſed for the geſtures of pantomimes, buffoons, mimics, and ſuch groteſque characters.

MASCHARSKA, in *Geography*, an iſland of Ruſſia, in the Frozen ſea, near the weſt coaſt of Nova Zembla. N. lat. 73°. E. long. 52° 14′.

MASCHERE SCENICHE, *Ital.*, dramatic maſks of the ancients. So immenſe was the ſize of the theatres of Greece and Italy, that we may naturally conclude a muſical declamation for the ſtage to have been a neceſſary conſequence of ſpeaking loud; for whoever ſhouts, halloos, or bawls, with ſufficient force to be heard further than common ſpeech can penetrate, makes uſe of fixed tones, which, if ſoftened, would become muſical: and it is well known that the tones of ſpeech are too tranſient and undetermined to be aſcer-

ascertained by those of music, or to be audible at a great distance, or in a wide space.

This want of natural power of voice sufficient to be heard in the open air, for the ancient theatres had no cover, and by a great multitude, gave rise not only to singing upon the stage, but perhaps to chanting in the church. The necessity of augmenting the force of a performer's voice by every possible means, first suggested the idea of dramatic masks, which were used by the actors upon the principle of speaking trumpets.

The mask was called by the Latins *persona*, from *personare, to sound through*; and delineations of such masks as were used in each piece were generally prefixed to it, as appears from the Vatican Terence. Hence *dramatis personæ, masks of the drama*; which words, after masks ceased to be used, were understood to mean *persons of the drama*.

Quintilian, lib. ii. gives a list of invariable masks appropriated to different characters, to which the public had for many ages been accustomed. And Julius Pollux is still more ample in his account of theatrical masks, used in tragedy, satire, and comedy. Niobe, weeping; Medea, furious; Ajax, astonished; and Hercules, enraged. In comedy, the slave, the parasite, the clown, the captain, the old woman, the harlot, the austere old man, the debauched young man, the prodigal, the prudent young woman, the matron, and the father of a family, were all constantly characterised by particular masks. This custom is, in some measure, still preserved in the Italian comedy, and in our pantomime entertainments, which originated from it.

MASCHIGIKA, in *Geography*, a bay on the N.W. coast of Nova Zembla. N. lat. 76° 25'. E. long. 59° 14'.

MASCITI, Michele, in *Biography*, an Italian performer on the violin at the beginning of the last century, and a voluminous composer for that instrument. In Le Cene's catalogue at Amsterdam for 1729, there is a list of seven of his works, engraved on copper, consisting of solos, duets, sonatas, and concertos.

MASCLE, or Macle, in *Heraldry*, a bearing which differs both from the lozenge and fusil in this respect, that according to the sentiments of all authors, it should be exactly square and voided.

According to Guillim, the mascle represents the mash of a net, and is an honourable bearing. It only differs from a lozenge, by being voided.

When any coat, in which one or more mascles are borne, is to be blazoned, it is necessary to mention their number, and how they are placed; and if they are conjoined, that circumstance must also be mentioned.

MASCLEF, Francis, in *Biography*, a learned French priest and orientalist, was born at Amiens about the year 1672. He was educated for the church, and while he was very young, applied himself most diligently to the study of the sacred scriptures, and with this view he made himself master, not only of the Greek and Hebrew languages, but also of the Syriac, the Chaldee, and the Arabic. He obtained considerable preferment in the church, and to assist the young clergy in their pursuits, he drew up "A Course of Philosophy," and "A Course of Divinity," which he intended for publicati..n, but was from various unforeseen circumstances obliged to relinquish his design. His application to study, and his abstemious manner of living, irreparably injured his health, and he died in 1728, at the age of sixty-six. He was the author of "Ecclesiastical Conferences in the Diocese of Amiens, on the Duties and Obligations of the Ecclesiastical State, and on the principal Truths of Religion;" and some controversial pieces. But his celebrity with posterity chiefly rests on his "Grammatica Hebraica," which is a work of great merit, and does high honour to the author's erudition and his latinity. This was first printed at Paris in 1716, and the author's attack upon vowel points involved him in a controversy with M. Guarin, a learned Benedictine monk. In 1730, Masclef, in conjunction with the abbé de la Bletterie, one of the fathers of the oratory, published the second edition of his grammar in two volumes, 12mo.; the first consisting of the original work greatly enlarged; and the second containing three other grammars, *viz.* the Chaldee, the Syriac, and the Samaritan, together with a reply to the objections of M. Guarin, entitled "Novæ Grammaticæ Argumenta ac Vindiciæ."

MASCOBU, in *Geography*, a town of New Mexico, in the province of Mayo; 110 miles N.E. of Santa Cruz.

MASCULINE, something belonging to the male, or the stronger of the two sexes.

Masculine is more ordinarily used, in *Grammar*, to signify the first and worthiest of the genders of nouns.

The masculine gender is that which belongs to the male kind, or something analogous to it.

Most substances are ranged under the heads of masculine or feminine. This, in some cases, is done with a shew of reason, but in others it is merely arbitrary; and on that account, is found to vary according to the languages, and even according to the words introduced from one language into another. Thus, the names of trees are generally feminine in Latin, and masculine in the French.

Farther, the genders of the same word are sometimes varied in the same language. Thus *alvus*, according to Priscian, was anciently masculine, but is now become feminine. And *navire*, a ship, in French, was anciently feminine, but is now masculine. See Gender.

Masculine *Rime*, in the *French Poetry*, is that made with a word which has a strong, open, and accented pronunciation; as all words have, excepting those which have an *e* feminine in their last syllable.

For instance, *amour* and *jour*, *mort* and *fort*, are masculine rimes; and *père* and *mère*, *gloire* and *memoire*, are feminine. Hence also verses ending with a masculine rime, are called masculine verses; and those ending with a feminine rime, feminine verses.

It is now a rule established among the French poets, never to use above two masculine, or two feminine verses successively, except in the looser kinds of poetry.

Marot was the first who introduced this mixture of masculine and feminine verses; and Ronsard was the first who practised it with success. The masculine verses in French, should always have a syllable less than the feminine ones.

Masculine *Signs*. Astrologers divide the signs, &c. into masculine and feminine; by reason of their qualities, which are either active, and hot, or cold, accounted masculine; or passive, dry, and moist, which are feminine.

On this principle they call the Sun, Jupiter, Saturn, and Mars, masculine; and Moon and Venus, feminine. Mercury, they suppose, partakes of the two. Among the signs, Aries, Libra, Gemini, Leo, Sagittarius, and Aquarius, are said to be masculine; Cancer, Capricornus, Taurus, Virgo, Scorpio, and Pisces, are feminine

MASDEVALLIA, in *Botany*, a word of whose derivation we have no account, but it should seem to be formed of some proper name. Prod. Fl. Peruv. et. Chil. tab. 26. Swartz Orchid. in Schrad. N. Tourn. v. 1.

99. Clafs and order, *Gynandria Monandria.* Nat. Ord. *Orchideæ.*

Gen. Ch. *Cal.* Perianth fuperior, of one leaf, bell-fhaped, three-cleft; its fegments ovate, terminating in two fmall horns, the upper one rather the fhorteft. *Cor.* Petals two, oblong, oblique, fmall, the foremoft angle at their bafe moft prominent, their inner margin approaching the ftyle. Lip ovate, entire, flightly keeled, fomewhat ftalked, enclofed within the calyx. *Stam.* Anther a terminal hemifpherical lid; maffes of pollen ovate, ftalked, in pairs. *Pift.* Germen inferior, oblong; ftyle fhort, gibbous, channelled in front; ftigma in the fore part, concave. *Peric* Capfule oblong.

Eff. Ch. Calyx of one leaf, bell-fhaped, three-cleft. Lip ovate, fomewhat ftalked, fhorter than the calyx. Anther a terminal lid, deciduous.

1. M. *uniflora.* Syft. Veg. Peruv. et Chil. 238. The Peruvian name is *Hwaffahwaffi.*

By the above generic defcription, taken from profeffor Swartz's work, it is eafy to fee the propriety of confidering, as we have always done, the two inner leaves of the flower in *Orchideæ* as petals, not as leaves of the calyx; the latter part being, in this inftance, of one piece, and fo diftinct from the leaves in queftion, that Dr. Swartz is obliged to term them an inner calyx. See our account of CYMBIDIUM, DENDROBIUM, DIURIS, EPIDENDRUM, LIMODORUM, &c.

MASEBA, in *Geography*, a town of Sweden, in Weft Gothland; 54 miles E.S.E. of Gotheborg.

MASELSKOI, a town of Ruffia, in the government of Archangel; 20 miles S. of Kola.

MASENO, a village of the Valteline, celebrated for its baths; eight miles E.S.E. of Chiavenna.—Alfo, a river which rifes in the Alps, and runs into the Adda; four miles E. of Morbegno.

MASERA, a town of Arabia, in the province of Oman, on the coaft; 70 miles S.S.E. of Kalhat. N. lat. 22°.

MASERATA, a town of the duchy of Piacenza; 18 miles S. of Piacenza.

MASH, the name of a drink given to horfes or cattle. It is made of half a peck of ground malt, put into a pail; on which is poured as much hot fcalding water as will wet it well; then ftirring it about half an hour, till it becomes lukewarm, and fweet like honey, it is to be given to the horfe.

A mafh is only given after a purge, to make it work better; after hard labour, or for drink in time of ficknefs.

MASHAM, in *Geography*, a market town and parifh, partly within the liberty of St. Peter of York, and partly in the wapentake of Hang-Eaft, in the North Riding of Yorkfhire, England. It is fituated on the river Ure, at the diftance of nine miles from Rippon and 224 from London; and contained, according to the population return in the year 1801, 152 houfes, occupied by 1022 perfons. In the church, which is a handfome ftructure with a fine fpire, is a monument for fir Marmaduke Wyvill; and in the church-yard the lower half of a crofs, adorned with compartments of men and animals in relief. Leland mentions this town as "Maffeham, a pratye quick market town and a fair church. Several of the Scropes of Mafham were buried in York Minfter. Wiville dwillith a litle above Mafham on the further ripe of Ure." A weekly market is held in this town on Tuefdays, and three fairs annually. In the vicinity of Mafham ftood Jervaux abbey, founded in 1145 for Ciftertians: at the diffolution, the fcite was granted to the earl of Lennox. From the fragments of ruins which are fcattered over a great extent of ground, the outward walls appear to have been a mile in circumference. At Swinton, near Mafham, is the feat of the Danby family. At Clifton, a fhort diftance from the town, are the remains of a large building of ancient architecture, which was formerly the manfion of the lords Scroop of Mafham. Camden's Britannia by Gough, vol. iii. Daye's Tour in Yorkfhire, 8vo.

MASHANGUR, a town of Candahar, in the province of Cabul, on the river Sewad; 48 miles N. of Attock. N. lat. 33° 54′. E. long. 71° 7′.

MASHELSON, in *Agriculture*, a term ufed to fignify a mixture of wheat and rye, or what is fometimes called meflin. See MESLIN.

MASHUK, in *Geography*, a town of the Arabian Irak; 5 miles N.W. of Samira.

MASIADY, a town of Samogitia; 36 miles N.N.W. of Medniki.

MASJAN, a river of Perfia, which runs into the Sihon, in the province of Khorafan.

MASIDE, a fmall town of Spain, in the province of Galicia; 12 miles N.W. of Orenfe.—Alfo, a fmall ifland in the Eaft Indian fea. S. lat. 7° 25′. E. long. 130° 35′.

MASIN, a town of France, in the department of the Dora; five miles S.E. of Ivrea.

MASINA, a kingdom of Africa, fituated on the upper fide of the river Niger, S.E. of Beero, N. of Bambarra, and adjoining to Tombuctoo, which lies to the N.E. This ftate belongs to the Foulahs, who are chiefly occupied in pafturage, and who pay an aunual tribute to the king of Bambarra N. lat. 14° 50′ to 16°. W. long. 0° 3′ to 3°.

MASINGA, a town of Cacongo. S. lat. 5° 10′. E. long. 12° 8′.

MASIVAN, or MERZIFON, a town of Afiatic Turkey, in the government of Sivas; 90 miles N.W. of Sivas.

MASIUS, ANDREW, in *Biography*, was born in a fmall village near Bruffels, but at what particular year is uncertain. He purfued his academical ftudies at the univerfity of Louvain, where he carried away the firft honours in the clafs of philofophy, in 1553, when he was ftill a boy. After this he applied himfelf to the ftudy of the civil and canon law, and was nominated counfellor to the duke of Cleves. He was a moft extraordinary linguift, and was deeply learned in the ancient and oriental languages, as well as in all modern European tongues. He filled feveral confiderable offices in the ftate, at Vienna and Conftantinople. By order of Philip II., king of Spain, he was fent to Antwerp, and affociated with Montanus and Fabricius, &c in publifhing the Bible Royal, or Antwerp Polyglot. He died in the territory of Cleves, in the year 1573. His works are numerous, chiefly grammatical and theological: of which we notice the "Grammatica Syriaca:" "Syrorum Peculum," or an explanation of peculiar words, which occur frequently in Syriac writers: "Lexicon Græcum, et Græcæ Linguæ Inftitutiones." Moreri.

MASK. See MASQUE and MASCHERE.

MASK-*Lough*, in *Geography*, the name of a large lake between the counties of Mayo and Galway, in Ireland. It has to the north a communication with lough Carrah; and there is fuppofed to be a fubterraneous channel, by which the fuperfluous waters of both are difcharged into lough Corrib, near the village of Cong. Beaufort.

MASKALWA, a town of Ruffia, in the government of Irkutfk, on the Angara; 24 miles N. of Balaganfkoi.

MASKELYNE, Nevil, in *Biography*, an eminent astronomer and mathematician, who filled the important office of astronomer royal of England for the long period of 46 years, with the highest credit to himself, and with great advantage as well as honour to his country. He was descended from a good family long settled in Wiltshire, and was born in London in the year 1732. At nine years of age he was placed at Westminster school, where he continued until he was fifteen, and where he made a distinguished progress in classical learning. He also paid due attention to English literature; but manifested a particular desire to understand astronomy, and the construction of optical instruments. This predilection, it is said, was considerably increased on seeing the memorable solar eclipse of 1748, exhibited through a large telescope in a camera obscura. It is, indeed, highly probable that so unusual a phenomenon might have made a strong impression on his susceptible mind, and stimulated him to those exertions which led to his future eminence. From this period he applied himself with ardour to the study of astronomy and optics; but soon experienced the necessity of laying a proper mathematical foundation for those sciences; and he therefore turned his attention to the elements of geometry and algebra, which he learned in a few months without the help of a master. Thus, like most other eminent mathematicians, he may be considered, in a great measure, as self-taught; but, contrary to the usual course of such studies, his early turn for astronomy led to his mathematical attainments.

In 1749, he was entered at the university of Cambridge: he was first placed at Catherine-hall, but soon after removed to Trinity-college, where he pursued his favourite studies with increased success; and, on taking his first degree, received distinguished honours from the university. He took his several degrees at the following periods, A. B. in 1754; A. M. in 1757; B. D. in 1768; and D. D. in 1777.

As soon as he was of age for holy orders, he was ordained to the curacy of Barnet, where he officiated for some time; and where he devoted most of his leisure hours to the study of practical astronomy.

In 1756, he became a fellow of his college, and though it was several years before he took his doctor's degree, we shall henceforward mention him under the title of doctor, as that by which he has been so long and so familiarly known to the scientific world.

In 1758, he was elected a fellow of the Royal Society, and he soon after became an important contributor to the Philosophical Transactions. This learned body, who at that time paid particular attention to astronomical and mathematical subjects, selected him to go to the island of St. Helena, to observe the transit of Venus over the sun's disk, which was to take place June 6, 1761. As this observation was to settle an important element in astronomy (the sun's parallax), it excited much attention, and preparations were made in different countries for observing it with accuracy. Two other astronomers, *viz.* Mr. Charles Mason, and Mr. Jeremiah Dixon, were sent for the same purpose to Bencoolen; and his majesty, George II., granted supplies for these expeditions. The French king likewise sent astronomers, to observe the transit, to Pondicherry, to the island of Roderigo, and to the north of Siberia.

Dr. Maskelyne sailed for St. Helena on board the Sea Horse frigate, captain Smith, and remained ten months on the island, making astronomical observations and philosophical experiments. His observation of the transit of Venus was not completely successful, owing to the cloudy state of the weather; but his voyage answered a more important purpose, and one far more useful to his country, than that originally intended: it afforded him an opportunity of taking lunar observations, which were now for the first time made with effect. This method of finding the longitude at sea had been long contemplated as a grand desideratum in navigation; and plans and preparations had been made for the purpose by Flamsteed, Newton, La Caille, Euler, Halley, Bradley, Mayer, and others: but the honour was reserved for Dr. Maskelyne to reduce their theories to successful practice. This he was enabled to do by means of Hadley's quadrant recently invented; and also by professor Mayer's lunar tables, for which a parliamentary reward of 3000*l.* was afterwards given on Dr. Maskelyne's report of their correctness. See our articles Greenwich, Longitude, and Lunar *Observations*.

During the voyage, both outward and homeward, he exercised the officers on board in taking lunar observations, and taught them to clear the distances from the effects of parallax and refraction, and thence to find the longitude within certain limits. While on the island he made accurate observations on the tides, the variation of the compass, and the comparative gravity of bodies there and at London. He also observed the annual parallax of Sirius, and the horary parallaxes of the moon. The chief results of these operations are inserted in the Philosophical Transactions of the above period.

Soon after his return from St. Helena, he published his well-known work, entitled "The British Mariner's Guide," which contained, among various new and practical illustrations and articles in nautical astronomy, rules and examples for working the lunar observations; but, in order to shorten and simplify these laborious operations, other tables and calculations were still wanted, which he afterwards supplied by his Nautical Almanac and Requisite Tables.

In 1763, he undertook another scientific voyage by appointment of the lords of the Admiralty and the Board of Longitude. He sailed for Barbadoes, on board the Princess Louisa, admiral Tyrrel, for the following purposes:—To find the longitude of that island by astronomical observations; to determine the rate of going of Mr. Harrison's new time-keeper; and to try Mr. Irwin's marine-chair, which was intended for making steady observations at sea, but which did not answer. He was, besides, in the course of his voyage, to take lunar observations with a curious new Hadley's sextant, and to determine the longitude by the eclipses of Jupiter's satellites, and the occultations of fixed stars by the moon. All these objects of the expedition he executed to the entire satisfaction of his employers; and he likewise officiated as chaplain to the ship during the voyage.

In 1764, the office of astronomer royal became vacant by the death of Mr. Bliss, who had survived his appointment, as successor to Dr. Bradley, only two years. Dr. Maskelyne's celebrity immediately pointed him out as the most competent person to fill the situation. His reputation stood very high in the Royal Society, both as a profound mathematician, and an able astronomer; while his experience at sea, and, above all, his success in establishing the lunar observations, seemed to render him peculiarly well qualified to carry into effect the purpose for which the Royal Observatory had been established—that of preparing tables for finding the longitude at sea. Through want of this knowledge, it was said, that not only single ships, but whole fleets had been lost, which induced government to offer immense rewards for practical methods of determining the problem. When Mr. Flamsteed, the first astronomer royal, was appointed to the office

office in 1675, he was directed by king Charles II. "to apply himself with all diligence to the rectifying the tables of the motions of the heavens, and the places of the fixed stars, in order to find out the much desired longitude at sea, for the perfecting the art of navigation." These were the words of his commission, which have been since continued to his successors. Thus, the office of astronomer royal was justly considered of great national importance, and Dr. Maskelyne's appointment to it, which was announced in the London Gazette, Feb. 16, 1765, gave universal satisfaction. It should be noticed, that the office includes a seat at the Board of Longitude, *i. e.* a board formed of commissioners, who are appointed "for examining, trying, and judging all proposals, experiments, and improvements relating to the longitude."

During the long period of Dr. Maskelyne's official services, his time may be considered as chiefly occupied either at the Observatory, the Board of Longitude, or the Royal Society. His biography, therefore, like that of most other scientific men, consists chiefly in a history of his labours; and as they are very numerous, and likewise well known to the astronomical world, we shall state them in a brief and summary manner, referring our readers occasionally to publications where they are more particularly detailed.

Soon after his appointment, he laid before the Board of Longitude the plan of an annual publication, to be entitled the "Nautical Almanac, and Astronomical Ephemeris." The first volume was for 1767, and it has been continued, under his direction, up to the year 1816, inclusive, making in the whole fifty volumes, a lasting monument of labour and profound learning. It is universally allowed to be the most useful work on practical astronomy ever published. In such high estimation has it been held by foreign astronomers, that they have generally and implicitly adopted its computations, and acknowledged its superior accuracy. M. Lalande, in giving an account of similar publications, says, "Le Nautical Almanac de Londres est l'Ephéméride la plus parfaite qu'il y ait jamais eu."

In 1767, he published an auxiliary work, entitled "Tables requisite to be used with the Nautical Almanac, in order to find the Latitude and Longitude at Sea." This performance, well known to seamen by the name of "The Requisite Tables," has passed through several editions, and has been successively enlarged, particularly by different methods of working the lunar observations, by Messrs. Lyons, Dunthorne, Witchell, Wales, and by Dr. Maskelyne himself; and it has been also improved by the latitudes and longitudes of places supplied by captain Cook, captain Huddart, Messrs. Bailey, Wales, and other scientific navigators. Some time after this, he published Mayer's Tables, with both Latin and English explanations, to which he added several tracts and tables of his own, and prefixed to the whole a Latin preface, with the title "Tabulæ motuum Solis et Lunæ, &c." It was published, like the foregoing works, by order of the commissioners of longitude, and the various other publications issued by that Board during his time were also printed under his inspection, and are too numerous to be here stated.

Another important and laborious duty that devolved on him in consequence of his office was, to examine the pretensions of the various candidates, who claimed the parliamentary rewards for new or improved methods of finding the longitude.

It may be observed, that his appointment took place at a period peculiarly interesting in the history of astronomy. His success in introducing and promoting the lunar observations greatly excited the public attention to the subject of the longitude, which was rendered still more interesting by the great rewards held out by parliament for further improvements in the problem, whether by astronomical or mechanical methods. These offers, united with the powerful motives of honour and emulation, called forth, during several years, many extraordinary efforts of genius, and produced useful inventions both in arts and sciences, and particularly in the construction of time-keepers. See Chronometer.

The parliamentary offers likewise encouraged numerous candidates of very slight pretensions, and even visionaries whose applications became very troublesome. The claims of all were referred by the Board of Longitude to the astronomer royal, by whom scientific plans were examined, and the rates of chronometers ascertained. Thus by his office he was constituted arbiter of the fame and fortune of a great number of anxious projectors; and it is easy to conceive how arduous as well as unpleasant such a duty must have been. It was not indeed to be expected that the sanguine hopes and self-love of such a variety of candidates could be gratified, with justice to the high trust and confidence thus reposed in him; and hence complaints were frequently heard, and pamphlets published, expressive of discontent and disappointment.—Appeals even were made to parliament; but whatever difference of opinion might have then existed, time and experience have since fully proved the truth and impartiality of Dr. Maskelyne's decisions.

In giving a general view of his labours at the Royal Observatory, we shall begin with his publication of the Greenwich observations, which were printed in 1774, by command of his majesty. The first volume began with the observations of 1765, and they have been continued annually since. M. Lalande, in mentioning this performance in 1792, calls it "le recueil le plus précieux que nous ayons." Since that period they have been considerably improved, and are universally allowed to possess an unrivalled degree of accuracy. His catalogue of the right ascensions and declinations of 36 principal fixed stars, with tables for their corrections, is a most useful and important performance, and is adopted in all observatories. It is mostly distinguished by the appellation of "Dr. Maskelyne's 36 Stars." His observations also of the sun, moon, and planets, are equally esteemed, and have been made the basis of the solar and lunar tables, lately computed in France according to the theory of M. Laplace; and which are republished in professor Vince's Astronomy, vol. iii. The solar tables were calculated by M. Delambre, and the lunar by M. Burg: copies of which have been transmitted to Dr. Maskelyne, by order of the French Board of Longitude, with the following grateful acknowledgment of the important assistance derived from his Greenwich observations. The letter is worthy of being recorded, as highly honourable to all parties, and as an interesting article in the history of astronomy. The following is a copy.

"Institut National, Classe des Sciences Physiques et Mathématiques, Paris, le 20 Fevrier, 1806. Le Secrétaire perpétuel pour les Sciences Mathématiques à Monsieur Maskelyne, Astronome Royal et Membre de la Société Royale de Londres.

"Monsieur, et respectable Confrère,

"Le Bureau des Longitudes me charge de vous offrir sept exemplaires des tables qu'il vient de publier. Cet hommage de sa haute estime et de sa réconnoissance étoit bien dû à l'auteur du plus grand et du plus précieux recueil d'observations qui existe. C'est à cette source que nous avons puisé Monsieur Burg et moi pour la plus exacte détermination des coefficiens des équations lunaires et solaires, c'est

là

là que nous avons trouvé la confirmation des inégalités que la théorie peut bien indiquer, mais dont la valeur ne pourroit être fixée que par des calculs qui sont encore au dessus des forces de l'analyse ; enfin, c'est à vous que nous devons la connoissance des mouvemens moyens et de toutes les constantes que l'observation seule peut donner. Recevez donc avec bienveillance, un ouvrage auquel vous avez si puissamment contribué. Nous serons très flattés si vous jugez nos tables dignes d'être employées aux calculs du Naùtical Almanac, suivant l'apparence que nous en donne votre derniere preface."—DELAMBRE.

Such is the testimony to the superior accuracy of the Greenwich observations given by the great astronomers of France ; and it is truly gratifying to observe, that the hostile state of the two countries did not prevent friendly communications on astronomy. War should never extend to the sciences ; and least of all to that sublime study which does the highest honour to the human intellect, and which has rendered the most essential services to mankind.

It would greatly exceed our limits to enumerate all the corrections and improvements effected by Dr. Maskelyne's observations, many of which will be found in professor Vince's Astronomy, and in the Philosophical Transactions.

His communications to the Royal Society are distinguished, like his other productions, for great attention to utility as well as accuracy. They consist chiefly of astronomical observations ;—improvements of mathematical and optical instruments ;—computations of the eclipses of the sun, moon, and Jupiter's satellites ;—articles on parallaxes, light, vision, refraction, weights, measures, gravitation, &c. with calculations and predictions of comets ; making in the whole above thirty communications. It should be noticed that, in 1774, he went to Shehallien, in Perthshire, in order to ascertain the lateral attraction of that hill ; by which the mean density of the earth was computed, and its central attraction according to the Newtonian theory first demonstrated. For this paper he was presented by the Council of the Royal Society with sir George Copley's gold medal.

In the history of science, few persons can be mentioned who have contributed more essentially to the diffusion astronomical knowledge than Dr. Maskelyne ; and perhaps no man has been so successful in promoting practical astronomy, both by land and sea. During his time private observatories became very general, though scarcely known before ; nor could such be made useful without his Nautical Almanac, and other tables, except by men of great science, and by very laborious calculations. Beside the assistance thus derived from his publications, he was always ready to give advice concerning any plans that were likely to promote the science. Among the observatories that were erected through his encouragement, may be mentioned that of the late Alexander Aubert, esq , whose excellent collection of instruments has been rarely equalled, even in national institutions. M. Lalande makes the following honourable mention of this gentleman and of his liberal pursuits.

" M. Alexandre Aubert, directeur des assurances, avoit fait un très joli observatoire qui étoit près de Greenwich, à Loam-pit-Hill, il a d'excellens instrumens de Bird, qui etoit son ami : il observe souvent et avec la plus grande exactitude. En 1788, il a transporté son observatoire à Highbury, une lieue au nord de Londres, au-delà d'Islington." Astronomie, par Lalande, tom. i. p. xxxv.

Several other instances might be adduced of observatories which were erected by the advice or direction of the astronomer royal. He was besides a great improver of instruments, and the inventor of some, among which may be noticed the prismatic micrometer ; but though profoundly skilled in optics, and ingenious in mechanical contrivances, he always paid great deference to the opinions of opticians, and other practical mechanists.

His plans were mostly directed to substantial objects, while a steady perseverance gave an efficiency to all his undertakings : and notwithstanding his profound knowledge of physical astronomy, his attention was chiefly directed to reduce the scientific theories of his predecessors to the practical purposes of life. In this he was eminently successful, particularly in his labours for the longitude, by which he essentially contributed to the advancement of navigation, the prosperity of commerce, and the wealth, honour, and power of his country.

Thus, from Dr. Maskelyne's important labours, his public character is well known, and his fame immoveably established : and, as to his private character, it was likewise truly estimable. He was, indeed, exemplary in the discharge of every duty. In his manners he was modest, simple, and unaffected. To strangers he appeared distant, or rather diffident ; but among his friends he was cheerful, unreserved, and occasionally convivial. He was fond of epigrammatic thoughts and classical allusions ; and even sometimes indulged in playful effusions of this kind, as appears by the following lines, which he composed on seeing Mr. Russell's selenographia, or map of the moon, executed with so much exactness.

He makes Luna thus speak ;

" Me prope viderunt Actæon, Endymionque ;
Hos memini solos ; ast ubi Russelius ?"

which he thus translated,

" Actæon and Endymion saw me near :
But when did I to Russell thus appear ?"

This epigram was composed extemporaneously when he was about seventy years of age, and is therefore the more worthy of being remembered as an instance of his lively and pleasant disposition at that advanced period. It also shews his passion for astronomy, which displayed itself so early in life, and which seemed to increase with his years.

Notwithstanding the doctor's numerous avocations he found time to maintain a regular correspondence with the principal astronomers of Europe. He was visited also by many illustrious foreigners, as well as eminent characters of his own country, but his warmest attachments were always manifested to the lovers of astronomy. Among his most intimate friends may be reckoned Dr. Herschel, Dr. Hutton, Messrs. Wollastons, Mr. Aubert, bishop Horsley, sir George Shuckburgh, baron Maseres, professor Robertson ; and also professor Vince, whose publications so ably illustrate Dr. Maskelyne's labours, and whom he appointed the depositary of his scientific papers.

Dr. Maskelyne had good church preferment from his college ; and his paternal estates (of which he was the last male heir), were also considerable. He married, when rather advanced in life, a young lady of large fortune, the sister and co-heiress of lady Booth of Northamptonshire, by whom he had one daughter, whose education he superintended with the fondest care. These ladies survive him, and also his sister Margaret, who was married to Robert, the late lord Clive.

Dr. Maskelyne died on the ninth of February 1811, in the 79th year of his age. His health previously declined for some months ; and he contemplated his approaching dissolution with pious resignation, and with a lively hope of being admitted into the presence of that Deity, whose works he had so long studied and so ardently admired. His favourite science tended the more strongly to confirm his religious principles, and he died, as he had lived, a sincere Christian.

MASKELYNE's *Islands*, in *Geography*, so called after Dr. Maskelyne, a cluster of small islands in the South Pacific ocean, lying off the south-east point of Mallicollo island. N. lat. 16° 32'. E. long. 167° 59'.

MASKINGIE, a river of Canada, which runs into lake Michigan, N. lat. 47° 25'. W. long. 86° 30'.

MASKO, a town of Sweden, in the government of Abo; 9 miles N.W. of Abo.

MASLACH, in the *Materia Medica* of the Turks, the name of a medicine greatly in use among those people, and called also *anfion* or *amphion*. It is prepared principally of opium. They take a dram of it at a time, and sometimes two or three: they always use it when going to battle, and very often as a provocative to venery, as they do the crude opium.

MASLAWSTANO, in *Geography*, a town of Poland, in the palatinate of Kiev; 36 miles E.S.E. of Bialacerkiev.

MASLEMA, a town of Asiatic Turkey, in the province of Diarbekir; 28 miles N.N.E. of Racca.

MASLIN. See BULLIMONY.

MASNED, in *Geography*, a small island of Denmark, near the S. coast of Zealand. N. lat. 54° 59'. E. long. 11° 54'.

MASOLINO DA PANICALE, in *Biography*, a painter, concerning the exact time of whose birth and death the biographers of the older artists differ exceedingly; one making him die at the age of 37, in the year 1415, another in 1418, and a third in 1440. It appears most probable, from a circumstance mentioned in the life of Masaccio, that the truth lies nearer the latter than the former periods; and that he must have lived somewhat longer than 37 years. In the first place, all agree that Masaccio, who was born in 1402, was taught the art of painting by Masolino, whom he saw executing his labours in the chapel of Brancacci, in the church of St. Pietro al Carmine at Florence, and again it is said by the same biographers, that Masaccio learnt for the first time the death of his master upon his return from Rome, at which time it is most probable he was 30 years of age, or thereabouts; and then was engaged to finish the pictures which Masolino had left incomplete, and not till then; which would hardly have been the case if Masolino had died in 1415, or 1418, since Masaccio was a reputed painter before he was 20 years old, and almost, if not quite, at the head of the profession before he was 25.

Panicale was in his early life employed as a goldsmith, and afterwards learnt under Lorenzo Ghiberti the arts of modelling and casting in bronze; and became one of Ghiberti's best workmen, particularly in clearing out the figures after casting. At the age of 19, he chose to study painting, and for that purpose engaged himself with Starnina. Few of the works of Masolino are now known. The principal ones are the hall of the Orsini palace at Rome; and his History of St. Peter in the church of St. Pietro, at Florence, above-mentioned. He seems to have greatly improved upon the style of the school of Giotto, and was probably led to it by having wrought with Ghiberti in sculpture. His style, though still dry and meagre, exhibited symptoms of a certain harmony and grandeur unknown before.

MASON, JOHN, an English nonconformist divine, was born at Dunmow, in Essex, in the year 1705-6. His father, who was a dissenting minister, sent him to pursue his academical studies under Mr. Jennings, of Kibworth, in Leicestershire. This was in the year 1722; and the first situation which Mr. Mason had after he had completed his academical course, was that of chaplain and private tutor in the family of Mr. Feaks, at his seat near Hatfield. In the year 1729 or 30, he accepted an invitation to become pastor to a congregation at Dorking, in Surrey, with which he continued about seventeen years, diligently discharging the duties of his function, highly esteemed both as a preacher and friend. In 1745 he published his treatise on "Self-Knowledge," which is unquestionably one of the most valuable works on practical religion in the English language. It is probable that not less than a hundred thousand copies of this work have been circulated in our own country; and it has been translated into almost all the European tongues. In the year 1746, Mr. Mason removed to Cheshunt, in Hertfordshire, where he spent the remainder of his days as a useful preacher, and continued to benefit, not only the village in which he lived by his public discourses and private exhortations, but to enlighten and improve the public by his writings. He died in February, 1763, in the fifty-eighth year of his age. As a divine, his most important publications are, 1. "The Lord's-day Evening Entertainment," in four volumes: 2. "The Student and Pastor; or Directions how to attain Eminence and Usefulness in those respective Characters:" 3. "Christian Morals," in two volumes: and "Fifteen Discourses, Devotional and Practical." Mr. Mason published, likewise, in the year 1750, "An Essay on Elocution," which was exceedingly well received, and went through three editions in a very short space of time, and may be considered as the foundation of many of our popular treatises on the same subject. Not long afterwards he published "An Essay on the Power and Harmony of Prosaic Numbers;" and "An Essay on the Power of Numbers, and the Principles of Harmony in Poetical Compositions." In 1761, the author reprinted these and the "Essay on Elocution," in one volume, octavo. Besides the articles already mentioned, Mr. Mason published some single sermons preached on particular occasions. As a preacher his sermons were correct, perspicuous, nervous, always illustrative of the text and doctrine which he had undertaken to explain; and they were ever adapted to promote the purposes of piety and charity. In the pulpit he was grave and solemn, his voice was clear, his delivery deliberate, distinct, and void of all affectation, and his manner was easy and natural. His personal character was an exemplification of the duties and virtues which it was the business of his life to enforce; in his intercourse with the world, he was free, easy, communicative, and pleasant in conversation, and much of the gentleman appeared in all his behaviour. Although it is now nearly half a century since this excellent man was taken from our world, there is still a member of his church at Cheshunt living, who cherishes, and will ever cherish, the recollection of the virtues of her pastor, so long as her life and faculties are continued. Life prefixed to the fifteenth edition of the treatise "On Self-Knowledge."

MASON, WILLIAM, an English poet of considerable celebrity, born in 1725, was the son of a clergyman who held the living of Hull. He was admitted of St. John's college, Cambridge, where he took his first degree in 1745. He removed to Pembroke college, and was elected a fellow in 1747; he obtained the degree of M.A. in 1749, and entered into holy orders in 1754. He obtained the patronage of the earl of Holderneffe, by whom he was presented to the rectory of Aston, in Yorkshire, and who procured for him the appointment of chaplain to his majesty. In 1749, he printed "An Ode on the Installation of the Duke of Newcastle," as chancellor of the university of Cambridge,

bridge, which gained him reputation. "A Monody to the Memory of Pope," and a poem, entitled "Isis, an Elegy," added to his fame, which was still farther increased, in 1752, by the dramatic poem of "Elfrida." In this, and in his "Caractacus," published in 1759, he attempted the restoration of the ancient Greek chorus in tragedy. Mr. Mason did not originally compose these pieces for the modern stage, which he considered as sunk beneath his level by the corrupt taste of the public; and though attempts were afterwards made to fit them for representation, and they were brought upon the theatre, they could obtain no permanent place there. In 1756, he published a small collection of new "Odes." He was in all his pieces an imitator of Gray, but they have been thought to display more of the artificial mechanism of poetry than of its genuine spirit. His "Elegies," published in 1763, are in general marked with the simplicity of language proper to this species of composition, and they breathe noble sentiments of freedom and virtue. In the year 1772, appeared the first book of his "English Garden," a descriptive poem in blank verse, of which the fourth and concluding book was printed in 1781. The main object of this work was to recommend, by the charms of poetry, the modern system of natural or landscape gardening. In 1775, as a tribute to the memory of his friend Gray, he published the poems of that distinguished genius, to which are prefixed "Memoirs of his Life and Writings." Mason's observations on the character and genius of his friend did honour to his taste and feelings. This work was originally published in one quarto volume, but another edition was given to the public in four thin volumes, crown octavo. Mason, as has already been observed, was warmly attached to the principles of liberty: during the contest with America, he strongly expressed his disapprobation of the hostilities carrying on against the transatlantic part of the community. He was a zealous member of the Yorkshire Association, for procuring a reform in parliament, which, notwithstanding the exertions of the wisest patriots, and most virtuous of our countrymen, is still, apparently, at a great distance. Mr. Mason, in 1783, published in a quarto volume a translation of Fresnoy's Latin poem on the "Art of Painting," which unites great elegance of language and versification, with a correct representation of the original. As a clergyman, he obtained the preferments of precentor and canon-residentiary of the cathedral of York; and at that church he preached, in 1788, an "Occasional Discourse," on the subject of the slave-trade, which was an animated declamation against the inhumanity of that traffic. In the same year he published the poems of the poet-laureate, Whitehead, to which he prefixed a memoir. The centenary commemoration of the revolution in that year, called forth a new exertion of his lyric powers in a "Secular Ode," which breathed the spirit of his muse of freedom. Without referring to the other publications of Mr. Mason, we may observe that he lived to witness the French revolution, the horrors of which wrought a complete change in his political principles. He died in April, 1797, at the age of 72. His character in private life was exemplary for worth and active benevolence; and a tablet has been placed to his memory in the Poet's Corner in Westminster Abbey. Gentleman's Magazine.

Mr. Mason was not only an excellent poet and able divine, but a dilettante painter and musician; and in these last capacities an acute critic. We did not, however, agree with him in his reforming schemes of church music. He had been himself a good performer on the harpsichord; had some knowledge of composition, a refined taste, and was a very good judge of modern music; but his ideas of reforming cathedral music would reduce it to Calvinistical psalmody. He wished for nothing but plain counterpoint in the services and full anthems, and dull and dry harmony in the voluntaries, without melody, accent, or measure; and he preferred the mechanical execution of a barrel organ in church music, to the most judicious accompaniment of a consummate organist.

We think organ-playing, in the sublime style of Handel and Sebastian Bach, is so precious a faculty, that it should be cultivated and cherished as sedulously for the sake of the art of music, as the innocent amusement of the congregation.

Mr. Mason, as precentor of the cathedral of York, it is to be feared, has stript music of all its ornaments, as Jack did religion, in the Tale of a Tub.

There are, however, many excellent reflections in his "Compendium of the History of our Church Music," and, in general, a just and discriminate character of our ecclesiastical composers, in his "Copious Collection of those Portions of the Psalms of David, Bible, and Liturgy, which have been set to Music, and sung as Anthems in the Cathedral and Collegiate Churches of England. To which is prefixed a critical and historical Essay on Cathedral Music." Printed at York in 1782.

Though this excellent scholar, and charming poet, honoured us with his friendship, of which we were always ambitious; and though, from his knowledge of music, we regarded him as the most intelligent and refined of our lyric bards, we never could subscribe to his reform of cathedral music, farther than in the accentuation of the words, and distinction of long and short syllables, in which our old cathedral composers, as well as psalmodists, are egregiously defective; nor could we ever flatter him in his high opinion of Henry Lawes, as a musician of superior genius and learning, or for his perfect accuracy in expressing words; though Milton tells us that his

> "——— *tuneful* and *well-measur'd* song,
> First taught our English music how to *span*
> Words with just *note* and *accent*, not to scan
> With Midas-ears, committing short and long."

And Waller joins with Milton in saying, that other composers admit the poet's sense but *faintly* and *dimly*, like the rays through a church-window of painted glass; while his favourite Lawes

> "——— could truly boast
> That not *A syllable is lost*.

See Henry Lawes, and Comus.

Mason, a person employed, usually under the direction of an architect, in the raising of a stone building.

The word comes from the French *maçon*, which signifies the same. Some derive this farther from the barbarous Latin *machio*, *a machinist*, because these artificers are obliged to use machines for raising walls. Du-Cange derives it from *maceria*, a name given to the long fence-walls which inclose vineyards, &c. in which masons are supposed to have been first employed: "Mason est maceriarum constructor." M. Huet derives it from *mas*, an old word signifying *house*; hence mason is a person who makes *masses*, that is, *houses*. In the corrupt Latin, a mason was called *magister comacinus*, which Lindenbroeck derives from Comacina, an island in Romania, where, in the time of the Lombards, the best architects were found.

The chief business of a mason is to prepare the mortar,

 raise

M A S

raiſe the walls from the foundation to the top, with the neceſſary retreats and perpendiculars, form the vaults, and employ the ſtones as delivered to him.

When the ſtones are large, the buſineſs of hewing or cutting them belongs to the ſtone-cutters; though theſe are frequently confounded with the maſons. The ornaments of ſculpture are performed by carvers in ſtone, or ſculptors. The tools or implements principally uſed by maſons are the ſquare, level, plumb-line, bevel, compaſs, hammer, chiſſel, mallet, ſaw, trowel, &c.

Beſide the common inſtruments uſed in the hand, they have likewiſe machines for the raiſing of great burdens, the conducting of large ſtones, &c. The principal of theſe are the lever, wheel, pulley, &c.

In the eſtimation of the value of maſons' work, walls, columns, blocks of ſtone or marble, &c. are meaſured by the cubic foot; and pavements, ſlabs, chimney-pieces, &c. by the ſuperficial or ſquare foot. Cubic or ſolid meaſure is uſed for the materials, and ſquare meaſure for the workmanſhip. In the ſolid meaſure, the true length, breadth, and thickneſs, are taken and multiplied conſtantly together; in the ſuperficial, there muſt be taken the length and breadth of every part of the projection, which is ſeen without the general upright face of the building.

Examples. 1. Required the ſolid content of a wall, 53 feet 6 inches long, 12 feet 3 inches high, and 2 feet thick. The product of $53.5 \times 12.25 \times 2 = 1310.75$, or 1310 feet 9 inches.

2. Required the value of a marble ſlab, at 8*s.* *per* foot; the length being 5 feet 7 inches, and breadth 1 foot 10 inches. Anſ. 4*l.* 1*s.* 10½*d.*

3. In a chimney-piece, ſuppoſe the length of the mantle and ſlab each - - - 4 f. 6 inch.

Breadth of both together	3	2
Length of each jamb	4	4
Breadth of both together	1	9

Required the ſuperficial content? Anſ. 21 feet 10 inches. Hutton's Menſuration, p. 610.

Masons, *Free* or *Accepted*, a very ancient ſociety, or body of men; ſo called, either from ſome extraordinary knowledge of maſonry or building, which they are ſuppoſed to be maſters of, or becauſe the firſt founders of the ſociety were perſons of that profeſſion.

They are now very conſiderable both for numbers and character; being found not only in every country in Europe, but in other parts of the globe, and conſiſting principally of perſons of merit and conſideration. As to antiquity, they lay claim to a ſtanding of ſome thouſand years; and, it is ſaid, can trace up their original as early as the building of Solomon's temple. It is very doubtful when they were firſt introduced into this country: ſome have traced the origin of maſonry in general to the year 674, when glaſs-making was introduced; and it is certain that, after this time, many of our public buildings, in the Gothic ſtyle, were erected by men in companies, who, as ſome ſay, called themſelves *free*, becauſe they were at liberty to work in any part of the kingdom. Others have derived the inſtitution of free maſons from a combination among the maſons not to work without an advance of wages, when they were ſummoned from ſeveral counties, by writs of Edward III., directed to the ſheriffs, to aſſiſt in rebuilding and enlarging the caſtle, together with the church and chapel of St. George, at Windſor: accordingly it is ſaid, that the maſons agreed on tokens, &c. by which they might know one another, and to aſſiſt one another againſt being impreſſed, and not to work unleſs *free*, and on their own terms.

Dr. Henry, in his "Hiſtory," attributes the origin of the free-maſon ſociety in Britain to the difficulty found in former times, of procuring a ſufficient number of workmen to build the multitude of churches, monaſteries, and other religious edifices which the ſuperſtition of thoſe ages prompted the people to raiſe. Hence the maſons were greatly favoured by the popes, and many indulgences were granted in order to augment their number. In times like thoſe we ſpeak of, it may well be ſuppoſed that ſuch encouragement from the ſupreme paſtors of the church muſt have been productive of the moſt beneficial effects to the fraternity: and hence the increaſe of the ſociety may naturally be deduced. The doctor quotes, in confirmation of this, the words of an author who was well acquainted with their hiſtory and conſtitution. "The Italians," ſays he, "with ſome Greek refugees, and with them French, Germans, and Flemings, joined into a fraternity of architects, procuring papal bulls for their encouragement and their particular privileges; they ſtyled themſelves free-maſons, and ranged from one nation to another, as they found churches to be built: their government was regular; and where they fixed near the building in hand, they made a camp of huts. A ſurveyor governed in chief; every tenth man was called a *warden*, and overlooked each nine. The gentlemen in the neighbourhood, either out of charity or commutation of penance, gave the materials and carriages. Thoſe who have ſeen the accounts in records of the charge of the fabrics of ſome of our cathedrals near 400 years old, cannot but have a great eſteem for their economy, and admire how ſoon they erected ſuch lofty ſtructures."

Mr. W. Preſton, paſt-maſter of the Lodge of Antiquity, in a treatiſe on Maſonry, publiſhed in 1792, tracing its origin from the creation, ſuppoſes its introduction into England to have been prior to the Roman invaſion. Accordingly he appeals to thoſe remains of ſtupendous works executed by the Britons, ſtill exiſting, and which muſt have been executed at a much earlier period than the time of the Romans; and it is ſaid, that the Druids had among them ſeveral cuſtoms ſimilar to thoſe of the maſons, and that they derived their government from Pythagoras: but it is difficult to aſcertain the reſemblance for which the advocates of the early origin of the ſociety of free-maſons contend. Although maſonry is ſaid to have been encouraged by Cæſar, and by many Roman generals, who were governors in Britain, and the fraternity of maſons was actually employed in the conſtruction of many magnificent fabrics, we have no exiſting records of their lodges and conventions; and of the cuſtoms that prevailed in their aſſemblies the accounts tranſmitted to us are very imperfect. In the time of Carauſius the art of maſonry revived; and among other artificers, he collected a number of ingenious maſons from many different countries, and appointed his ſteward Albanus as the ſuperintendant of their aſſemblies. At this time, lodges, or conventions of the fraternity, began to be introduced. Albanus obtained from Carauſius a charter to hold a general council, of which he was preſident, and in which many new members were admitted. This Albanus is ſaid to have been the famous St. Alban, who ſuffered martyrdom in Britain for the Chriſtian faith. In proof of this fact, Mr. Preſton refers to ſome ancient manuſcripts. By the departure of the Romans from Britain, the progreſs of maſonry was checked, and it was afterwards wholly neglected. After the introduction of Chriſtianity, however, maſonry, together with other arts, revived, and lodges were formed; but being under the direction of foreigners, they gained no permanent reputation. After the year 557, when St.

Auſtin with his companions arrived in England, maſonry was taken under his protection; and the Gothic ſtyle of building was introduced by thoſe foreigners, who about this time reſorted to the kingdom. Auſtin, it is ſaid, diſtinguiſhed himſelf by being the head of the fraternity, who founded the old cathedral of Canterbury in 600; that of Rocheſter in 602; St. Paul's in London in 604; St. Peter's in Weſtminſter in 605; as well as many others. The number of maſons in England was thus greatly increaſed, as well as by his other buildings of caſtles, &c. throughout the kingdom. In 640 ſome ingenious artiſts arrived from France, and formed themſelves into a lodge under the direction of Bennet, abbot of Wirral, whom Kenred, king of Mercia, ſoon after appointed inſpector of the lodges, and general ſuperintendant of the maſons. Maſonry, however, during the heptarchy, was in a low ſtate; but it began to revive under the patronage of St. Swithin, who was employed by Ethelwolf in repairing ſome religious houſes; and from that time the art was gradually improved till the year 872, when it found a zealous protector in Alfred the Great, who appropriated a ſeventh part of his revenue in employing a number of workmen for rebuilding the cities, caſtles, &c. ruined by the Danes. During the reign of his ſucceſſor Edward, the maſons continued to hold their lodges under the ſanction of Ethred, huſband to the king's ſiſter, and Ethelward his brother, to whoſe care the fraternity was intruſted. The true re-eſtabliſhment of maſonry in England, however, is dated from the reign of king Athelſtan; and there is ſtill exiſting an ancient lodge of maſons in York, which traces its origin to this period. This lodge, ſaid to be the moſt ancient in England, was founded in 926, under the patronage of Edwin, the king's brother, who obtained for it a charter from Athelſtan, and became himſelf grand-maſter. By virtue of this charter all the maſons in the kingdom were aſſembled, and in their aſſembly, as it is reported, they eſtabliſhed a general or grand lodge for their future government. Under the patronage and juriſdiction of this lodge it is alleged, that the fraternity very conſiderably increaſed; and kings, princes, and other eminent perſons, who had been initiated into the myſteries, paid due allegiance to the aſſembly.

On the deceaſe of prince Edwin and king Athelſtan, the maſons were diſperſed, and remained in an unſettled ſtate till the reign of Edgar, in 960. They were then collected by St. Dunſtan, and employed in works to which they had been accuſtomed; but for want of permanent encouragement, their lodges declined, and maſonry remained in a low ſtate for more than fifty years. It revived under Edward the Confeſſor, in 1041; and by the aſſiſtance of Leofrick, earl of Coventry, he rebuilt Weſtminſter Abbey, the earl being ſuperintendant of the maſons. After the conqueſt, in 1066, Gundulph, biſhop of Rocheſter, and Roger de Montgomery, earl of Shrewſbury, both of them excellent architects, became joint patrons of the maſons; and under their auſpices the Tower of London was begun, though finiſhed only in the reign of William Rufus, who likewiſe rebuilt London bridge with wood, and in 1087 firſt conſtructed the palace and hall of Weſtminſter. During the reigns of Henry I. and of Stephen, the maſonic lodges aſſembled, and the ſociety was employed in building a chapel at Weſtminſter, near the Houſe of Commons, and other works; the preſident of the lodges being Gilbert de Clare, the marquis of Pembroke. Under the reign of Henry II., the lodges were ſuperintended by the grand-maſter of the Knights Templars, who employed them in building their temple in Fleet-ſtreet, in the year 1155. Maſonry continued under the patronage of this order till the year 1199, when John ſucceeded Richard I. in the throne of England, and Peter de Colechurch was then appointed grand-maſter. He began to rebuild London bridge with ſtone, which was afterwards finiſhed by William Alcmain, in 1209. Peter de Rupibus ſucceeded Peter de Colechurch in the office of grand-maſter, and Geoffrey Fitz-Peter, chief ſurveyor of the king's works, acted as deputy under him; maſonry continued alſo to flouriſh under the auſpices of theſe two artiſts during this and the following reign. On the acceſſion of Edward I. in 1272, the ſuperintendence of the maſons was intruſted to Walter Giffard, archbiſhop of York, Gilbert de Clare, earl of Glouceſter, and Ralph, lord of Mount Hermer, the progenitor of the family of the Montagues; and by theſe architects the abbey of Weſtminſter was finiſhed, after having been begun in 1220, during the minority of Henry II. During the reign of Edward II. the fraternity were employed in building Exeter and Oriel colleges in Oxford, Clare-hall in Cambridge, &c. under the auſpices of Walter Stapleton, biſhop of Exeter, who had been appointed grand-maſter of the maſons in 1307.

In the reign of Edward III. the lodges under his patronage were numerous; and the fraternity held communications under the protection of the civil magiſtrates. William a Wykeham continued grand-maſter on the acceſſion of Richard II., and by him both the New college in Oxford, and Wincheſter college, were founded at his own expence. After the acceſſion of Henry IV., Thomas Fitz-Allan, earl of Surrey, was appointed grand-maſter, who, after the engagement at Shrewſbury, founded Battle-abbey and Fotheringay; the Guildhall at London being alſo built in this reign. On the acceſſion of Henry V., the fraternity were directed by Henry Chichely, archbiſhop of Canterbury, under whom the lodges and communications of the fraternity were frequent. In 1425, however, during the reign of Henry VI. an act was made againſt the meetings of the chapters and congregations of maſons, becauſe it was ſaid, that by ſuch meetings "the good courſe and effect of the ſtatutes of labourers were openly violated and broken, in ſubverſion of the law, and to the great damage of all the commons." But this act was not put in force, nor did the fraternity ceaſe to meet as uſual under the protection of archbiſhop Chichely, who ſtill continued to preſide over them.

Notwithſtanding a charge alleged at this time againſt the maſons, the duke of Glouceſter, protector and guardian of the kingdom, appriſed of their innocence, took them under his protection, and transferred the charge of ſedition againſt Henry, biſhop of Wincheſter, and his followers. Although the duke was afterwards impeached, impriſoned, and murdered, the maſons were not only permitted to meet without moleſtation, but were joined by the king himſelf. In that year (1442) he was initiated into maſonry, and from that time was aſſiduous in making himſelf complete maſter of the art. He reviſed the conſtitutions of the body, and honoured them with his ſanction; and his example was followed by many of the nobility. The king preſided over the lodges in perſon, nominating William Wanefleet, biſhop of Wincheſter, grand-maſter. The biſhop, at his own expence, built Magdalen college, Oxford, and ſeveral religious houſes. Eton college, near Windſor, and King's college, at Cambridge, were alſo founded during this reign. Henry himſelf founded Chriſt's college, Cambridge, as his queen, Margaret of Anjou, did Queen's college in the ſame univerſity. About this time, the maſons were protected and encouraged by James I. of Scotland, who honoured the lodges with his preſence,

presence, and settled an annual revenue of four pounds Scots (an English noble) to be paid by every master-mason in Scotland, to a grand-master, chosen by the grand lodge, and approved of by the crown.

The flourishing state of masonry was interrupted by the civil wars between the houses of York and Lancaster, which brought it almost totally into neglect. About 1471, however, it revived under the auspices of Robert Beauchamp, bishop of Sarum, who had been appointed grand-master by Edward IV. and honoured with the title of *Chancellor of the Garter*, for repairing the castle and chapel of Windsor. It again declined during the reigns of Edward V. and Richard III.; but came once more into repute on the accession of Henry VII. in 1485. It was now patronised by the master and fellows of the order of St. John at Rhodes (now Malta); who assembled their grand lodge in 1500, and chose Henry for their protector. On the 24th of June, 1502, a lodge of masons was formed in the palace, at which the king presided as grand-master; and having appointed John Islip, abbot of Westminster, and sir Reginald Bray, knight of the Garter, his wardens for the occasion, proceeded in great state to the east end of Westminster Abbey, where he laid the first stone of that excellent piece of Gothic architecture, called Henry the Seventh's chapel. The cape-stone of this building was celebrated in 1507. The palace of Richmond, as well as many other noble structures, were raised under the direction of sir Reginald Bray; and the colleges of Brazen-Nose, in Oxford, and Jesus and St. John's in Cambridge, were all finished in this reign.

On the accession of Henry VIII. cardinal Wolsey was appointed grand-master; who built Hampton-court, Whitehall, Christ-church college, Oxford, with several other noble edifices; all of which, upon the disgrace of that prelate, were forfeited to the crown in 1530. Wolsey was succeeded as grand-master in 1534 by Thomas Cromwell, earl of Essex; who employed the fraternity in building St. James's palace, Christ's hospital, and Greenwich castle. Cromwell being beheaded in 1540, John Touchet, lord Audley, succeeded to the office of grand-master, and built Magdalen college, in Cambridge, and many other structures. In 1547, the duke of Somerset, guardian of the king, and regent of the kingdom, became superintendant of the masons, and built Somerset-house in the Strand; which, on his being beheaded, was forfeited to the crown in 1552.

After the death of the duke of Somerset, John Poynet, bishop of Winchester, presided over the lodges till the death of the king, in 1553. From this time they continued without any patron till the reign of Elizabeth, when sir Thomas Sackville accepted of the office of grand-master. Lodges, however, had been held during this period in different parts of England; but the general or grand lodge assembled in the city of York, where it is said the fraternity were numerous and respectable.—Of the queen we have the following curious anecdote with regard to the masons: hearing that they were in possession of many secrets, which they refused to disclose, and being naturally jealous of all secret assemblies, she sent an armed force to York, to break up their annual grand-lodge. The queen, however, being afterwards thoroughly convinced that the fraternity of masons did not interfere in state affairs, became quite reconciled to their assemblies, and from this time masonry made a considerable progress; lodges were held in different parts of the kingdom, particularly in London and its neighbourhood, where the number of the brethren increased considerably. Several great works were carried on there under the auspices of sir Thomas Gresham, from whom the fraternity received every encouragement.

Sir Thomas was succeeded in the office of grand-master by Charles Howard, earl of Effingham, who continued to preside over the lodges in the south till the year 1588, when George Hastings, earl of Huntingdon, was chosen grand-master, and remained in the office till the decease of the queen in 1603.

On the accession of James I. to the crown of England, masonry flourished, and lodges were held, in both kingdoms. A number of gentlemen returned from their travels, with curious drawings of the old Greek and Roman architecture, as well as strong inclination to revive a knowledge of it. Among these was the celebrated Inigo Jones, who was appointed general surveyor to the king. He was named grand-master of England, and was deputed by the king to preside over the lodges. Several learned men were now initiated into the mysteries of masonry, and the society increased considerably in reputation and consequence. Ingenious artists resorted to England in great numbers; lodges were constituted as seminaries of instruction in the sciences and polite arts, after the model of the Italian schools; the communications of the fraternity were established, and the annual festivals regularly observed. Under the direction of this accomplished architect, many magnificent structures were raised; and among the rest, he was employed, by command of the sovereign, to plan a new palace at Whitehall, worthy of the residence of the kings of England. This was executed; but for want of a parliamentary fund, no more of the plan was ever finished than the banqueting-house. Inigo Jones continued in the office of grand-master till the year 1618, when he was succeeded by the earl of Pembroke; under whose auspices many eminent and wealthy men were initiated, and the mysteries of the order held in high estimation.

After Charles I. ascended the throne, earl Pembroke was continued in his office till the year 1630, when he resigned in favour of Henry Danvers, earl of Danby. This nobleman was succeeded, in 1633, by Thomas Howard, earl of Arundel, the ancestor of the Norfolk family. In 1635, Francis Russel, earl of Bedford, accepted the government of the society; but Inigo Jones having continued to patronize the lodges during his lordship's administration, he was re-elected the following year, and continued in office till the year of his death, 1646. The progress of masonry, however, was for some time obstructed by the breaking out of the civil wars; but it began to survive under the patronage of Charles II., who had been received into the order during his exile. Some lodges during this reign were constituted by leave of the several noble grand-masters, and many gentlemen and famous scholars requested at that time to be admitted into the fraternity. On the 27th of December, 1663, a general assembly was held, where Henry Jennyn, earl of St. Alban's, was elected grand-master; who appointed sir John Denham his deputy, and Mr. Christopher Wren, afterwards the celebrated sir Christopher Wren, and John Webb, his wardens. At this assembly several useful regulations were made, for the better government of the lodges; and the greatest harmony prevailed among the whole fraternity. The earl of St. Alban's was succeeded in his office of grand-master by earl Rivers, in the year 1666, when sir Christopher Wren was appointed deputy, and distinguished himself beyond any of his predecessors in promoting the prosperity of the lodges which remained at that time, particularly that of St. Paul's, now the Lodge of Antiquity, which he patronized upwards of eighteen yeare. At this time he attended

attended the meetings regularly; and during his prefidency made a prefent to the lodge of three mahogany candlefticks, which at that time were very valuable. They are ftill preferved, and highly valued as a teftimony of the efteem of the donor.

Whilft the city, after its deftruction by fire in 1666, was in building, lodges were held by the fraternity in different places, and many new ones conftituted, to which the beft architects reforted. In 1674, earl Rivers refigned the office of grand-mafter in favour of George Villiers, duke of Buckingham, who left the care of the fraternity to his wardens, and fir Chriftopher Wren, who ftill continued to act as deputy. In 1679, the duke refigned in favour of Henry Bennet, earl of Arlington: but this nobleman was too deeply engaged in ftate-affairs to attend to his duty as a mafon, though the lodges continued to meet under his fanction, and many refpectable gentlemen joined the fraternity. During the fhort reign of James II. the mafons were much neglected. In 1685, fir Chriftopher Wren was elected to the office of grand-mafter, who appointed Gabriel Cibber and Mr. Edward Strong his wardens: yet notwithftanding the great reputation and abilities of this celebrated architect, mafonry continued in a declining way for many years, and only a few lodges were held occafionally in different parts of the kingdom.

At the Revolution, the fociety was in fuch a low ftate in the fouth of England, that only feven regular lodges were held in London and its fuburbs; and of thefe only two, *viz.* that of St. Paul's and one at St. Thomas's hofpital, Southwark, were of any confequence. But in 1695, king William, having been initiated into the myfteries, honoured the lodges with his prefence, particularly one at Hampton-court, at which he is faid to have frequently prefided during the time that the new part of his palace was building. Many of the nobility alfo were prefent at a general affembly and feaft held in 1697; particularly Charles, duke of Richmond and Lenox, who was elected grand-mafter for that year; but in 1698, refigned his office to fir Chriftopher Wren, who continued at the head of the fraternity till king William's death in 1702.

During the reign of queen Anne, mafonry made no confiderable progrefs. Sir Chriftopher's age and infirmities drew off his attention from the duties of his office, the annual feftivals were entirely neglected, and the number of mafons confiderably diminifhed. It was therefore determined that the privileges of mafonry fhould not be confined to operative mafons, but that people of all profeffions fhould be admitted to participate in them, provided they were regularly approved and initiated into the order.

Thus the fociety once more rofe into efteem; and on the acceffion of George I. the mafons, now deprived of fir Chriftopher Wren, refolved to unite again under a grand-mafter, and revive the annual feftivals. With this view, the members of the only four lodges at that time exifting in London, met at the Apple-tree tavern in Charles-ftreet, Covent-Garden; and having voted the oldeft mafter-mafon then prefent into the chair, conftituted themfelves a grand lodge *pro tempore.* It was now refolved to renew the quarterly communications among the brethren; and at an annual meeting held on the 24th of June the fame year, Mr. Anthony Sayer was elected grand-mafter, invefted by the oldeft mafter-mafon there prefent, inftalled by the mafter of the oldeft lodge, and had due homage paid him by the fraternity. Before this time a fufficient number of mafons, met together within a certain diftrict, had ample power to make mafons without a warrant of conftitution; but it was now determined, that the privilege of affembling as mafons fhould be vefted in certain lodges or affemblies of mafons convened in certain places, and that every lodge to be afterwards convened, excepting the four old lodges then exifting, fhould be authorized to act by a warrant from the grand-mafter for the time, granted by petition from certain individuals, with the confent and approbation of the grand lodge in communication; and that without fuch warrant, no lodge fhould hereafter be deemed regular or conftitutional. The former privileges, however, were ftill allowed to remain to the four old lodges then extant. In confequence of this, the old mafons in the metropolis vefted all their inherent privileges, as individuals, in the four old lodges, in truft that they never would fuffer the ancient charges and land-marks to be infringed. The four old lodges, on their part, agreed to extend their patronage to every new lodge which fhould hereafter be conftituted according to the new regulations of the fociety; and while they acted in conformity to the ancient conftitutions of the order, to admit their mafters and wardens to fhare with them all the privileges of the grand lodge, that of precedence only excepted.

Matters being thus fettled, the brethren of the four old lodges confidered their attendance on the future communications of the fociety as unneceffary; and therefore trufted implicitly to their mafters and wardens, fatisfied that no meafure of importance would be adopted without their approbation. It was, however, foon difcovered, that the new lodges being equally reprefented with the old ones at the communications, would at length fo far outnumber them, that by a majority they might fubvert the privileges of the original mafons of England, which had been centered in the four old lodges; on which account a code of laws was, with the confent of the brethren at large, drawn up for the future government of the fociety. To this the following was annexed, binding the grand-mafter for the time being, his fucceffors, and the mafter of every lodge to be hereafter conftituted, to preferve it inviolably; "Every annual grand lodge has an inherent power and authority to make new regulations, or to alter thefe for the real benefit of this ancient fraternity, provided always that the old land-marks be carefully preferved: and that fuch alterations and new regulations be propofed and agreed to at the third quarterly communication preceding the annual grand feaft; and that they be offered alfo to the perufal of all the brethren before dinner, in writing, even of the youngeft apprentice; the approbation and confent of the majority of all the brethren prefent being abfolutely neceffary to make the fame binding and obligatory." To commemorate this circumftance, it has been cuftomary, ever fince that time, for the mafter of the oldeft lodge to attend every grand inftallation; and, taking precedence of all prefent, the grand-mafter only excepted, to deliver the book of the original conftitutions to the new inftalled grand-mafter, on his promifing obedience to the ancient charges and general regulations.

By this precaution, the original conftitutions were eftablifhed as the bafis of all fucceeding mafonic jurifdiction in the fouth of England; and the ancient land-marks, as they are called, or the boundaries fet up as checks againft innovation, were carefully fecured from the attacks of any future invaders.

In 1720 the fraternity fuftained an irreparable lofs by the burning of feveral valuable manufcripts, concerning the lodges, regulations, charges, fecrets, &c. (particularly one written by Mr. Nicholas Stone, the warden under Inigo Jones.) This was done by fome fcrupulous brethren, who were alarmed at the publication of the mafonic conftitutions. At a quarterly communication it was this year agreed, that, for

for the future, the new grand-maſter ſhall be named and propoſed to the grand lodge ſome time before the feaſt: and if approved and preſent, he ſhall be ſaluted as grand-maſter elect: and that every grand-maſter, when he is inſtalled, ſhall have the ſole power of appointing his deputy and wardens, according to ancient cuſtom.

In the mean time, maſonry continued to ſpread in the north as well as the ſouth of England. The general aſſembly, or grand lodge at York, continued to meet as uſual. Several lodges met in 1705, under the direction of ſir John Tempeſt, bart. then grand-maſter: and many perſons of worth and character were initiated into the myſteries of the fraternity. The greateſt harmony ſubſiſted between the two grand lodges, and private lodges were formed in both parts of the kingdom, under their ſeparate juriſdiction. The only diſtinction which the grand lodge in the north appears to have retained is in the title of the *Grand Lodge of all England*; while the other was only called the *Grand Lodge of England*. The latter, however, being encouraged by ſome of the principal nobility, ſoon acquired conſequence and reputation, while the other ſeemed gradually to decline: but, till within theſe few years, the authority of the grand lodge at York was never challenged: on the other hand, every maſon in the kingdom held that aſſembly in the higheſt veneration, and conſidered himſelf bound by the charges which originated from that aſſembly. It was the glory and boaſt of the brethren in almoſt every country where maſonry was eſtabliſhed, to be accounted deſcendants of the original York maſons; and from the univerſality of the idea that maſonry was firſt eſtabliſhed at York by charter, the maſons of England have received tribute from the firſt ſtates in Europe. At preſent, however, this ſocial intercourſe is aboliſhed, and the lodges in the north and ſouth are almoſt entirely unknown to one another; and neither the lodges of Scotland nor Ireland court the correſpondence of the grand lodge at London. This is ſaid to have been owing to the introduction of ſome innovations among the lodges in the ſouth; but for the coolneſs which ſubſiſts between the two grand lodges, another reaſon is aſſigned. A few brethren at York having, on ſome trivial occaſion, ſeceded from their ancient lodge, they applied to London for a warrant of conſtitution. Their application was honoured without any inquiry into the merits of the caſe; and thus, inſtead of being recommended to the mother lodge to be reſtored to favour, theſe brethren were encouraged to revolt, and permitted, under the ſanction of the grand lodge in London, to open a new lodge in the city of York itſelf. This illegal extenſion of power juſtly offended the grand lodge at York, and occaſioned a breach which has never yet been made up.

The duke of Buccleugh, who in 1723 ſucceeded the duke of Wharton as grand-maſter, firſt propoſed the ſcheme of raiſing a general fund for diſtreſſed maſons. The duke's motion was ſupported by lord Paiſley, colonel Houghton, and a few other brethren; and the grand lodge appointed a committee to conſider of the moſt effectual means of carrying the ſcheme into execution. The diſpoſal of the charity was firſt veſted in ſeven brethren; but this number being found too ſmall, nine more were added. It was afterwards reſolved that twelve maſters of contributing lodges, in rotation with the grand officers, ſhould form the committee; and by another regulation ſince made, it has been determined that all paſt and preſent grand officers, with the maſters of all regular lodges which ſhall have contributed within twelve months to the charity, ſhall be members of the committee. This committee meets four times in the year by virtue of a ſummons from the grand-maſter or his deputy. The petitions of the diſtreſſed brethren are conſidered at theſe meetings; and if the petitioner be conſidered as a deſerving object, he is immediately relieved with five pounds. If the circumſtances of the caſe are of a peculiar nature, his petition is referred to the next communication, where he is relieved with any ſum the committee may have ſpecified, not exceeding twenty guineas at one time. Thus the diſtreſſed have always found ready relief from this general charity, which is ſupported by the voluntary contributions of different lodges out of their private funds, without being burdenſome to any member in the ſociety. Thus has the committee of charity for freemaſons been eſtabliſhed; and ſo liberal have the contributions been, that though the ſums annually expended for the relief of the diſtreſſed brethren have for ſeveral years paſt amounted to many thouſand pounds, there ſtill remains a conſiderable ſurplus.

What the end of the inſtitution of maſonry is, ſeems ſtill, in ſome meaſure, a ſecret; though ſo much of it as is known appears laudable enough, as it tends to promote friendſhip, ſociety, mutual aſſiſtance, and good fellowſhip.

The members of this ſociety, among whom we may reckon a great number of illuſtrious perſons in various parts of the world, allege, that in the admiſſion of members, and the management of its concerns, a particular regard is paid to the principles of religion and morality; they ſay alſo, that in proportion as maſonry has prevailed, ſocieties and even nations have been civilized. However this be, it is certain, that its ſigns ſerve as a kind of univerſal language, ſo that by means of them people of the moſt diſtant nations may become acquainted, and enter into friendſhip with one another. This muſt be allowed to be a circumſtance of no ſmall importance and utility, to thoſe who traverſe diſtant regions, and wiſh to find aſſociates and friends even among ſtrangers.

The brothers of this family are ſaid to be poſſeſſed of a great number of ſecrets, which have been religiouſly obſerved from age to age.

The uninitiated, however, ridicule the notion that maſons poſſeſs any peculiar ſecrets, apprehending, that in ſome unguarded and convivial moment or other, they would be divulged; and that it would be dangerous to repoſe confidence in the number, as well as in the various diſpoſitions, of thoſe who are admitted into the ſociety. Secrecy and ſilence are undoubtedly on many occaſions deſirable and laudable attainments; and we find that among many of the philoſophers of antiquity, they were ſtrictly enjoined and ſeduloully cultivated. If the laws, charges, and regulations of the free and accepted maſons, as they are detailed in a work, entitled "The Conſtitution of Free-Maſonry, &c." by the late Laurence Dermott, eſq., and reviſed and corrected with conſiderable additions by Thomas Harper, D. G. M. 1807, are faithfully recorded, which we have no reaſon to queſtion, they are not only irreproachable, but deſerving of commendation.

The abbé Barruel, however, who in his "Memoirs illuſtrating the Hiſtory of Jacobiniſm," tranſlated into Engliſh by the Hon. Robert Clifford, F.R.S. and A.S., and publiſhed in 1798, aſcribes the French revolution, and the ſubſequent convulſions on the continent of Europe, to the principles and operations of the freemaſons, pronounces a panegyric on the Engliſh maſons, and repreſents them as diſtinguiſhed from the others by ties which only appear to unite them more cloſely in the bonds of charity and fraternal affection. At the time, he ſays, when the Illuminées of Germany, the moſt deteſtable of the Jacobin crew, were ſeeking to ſtrengthen their party by that of maſonry, they affected a contempt for the Engliſh lodges.

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This zealous writer alfo allows, that for a confiderable length of time the generality of lodges both in France and Germany, might have been excepted from the charge which he adduces againft the objects of his cenfure and condemnation. The grand objects of the mafonry, which he criminates, were equality and liberty. The very name of free-mafon carries with it the idea of liberty; and as to *equality*, it was difguifed under the name of *fraternity*, which has nearly a fimilar fignification. The author feems to have been enrolled as a member of this fociety againft his own inclination; and he defcribes the manner in which he was admitted to the feveral degrees of "apprentice," "fellow-craft," and "mafter," in one evening. The grand object which he propofed to himfelf was to learn the famous fecret of mafonry. When the moment arrived that was deftined for this purpofe, he was ordered to approach nearer to the Venerable. Then the brethren who had been armed with fwords for the occafion, drawing up in two lines, held their fwords elevated, leaning the points toward each other, and formed what in mafonry is called the *arch of fteel*. The candidate paffes under this arch to a fort of altar elevated on two fteps, at the fartheft end of the lodge. The mafter, feated in an arm chair, or a fort of throne, behind this altar, pronounced a long difcourfe on the inviolability of the fecret which was to be imparted, and on the danger of breaking the oath which the candidate was going to take. He pointed to the naked fwords which were always ready to pierce the breaft of the traitor, and declared to him that it was impoffible to efcape their vengeance. The candidate then fwears, that rather than betray the fecret, he confents to have his head cut off, his heart and entrails torn out, and his afhes caft before the winds. Having taken the oath, the mafter faid the following words to him, which the reader (as he fays) may eafily conceive have not efcaped my memory, as I had expected them with fo much impatience, "My dear brother, the fecret of mafonry confifts in thefe words, *Equality and Liberty; all men are equal and free; all men are brethren*." The mafter did not utter another fyllable, and every body embraced the new *brother equal and free*. The lodge broke up, and we gaily adjourned to a mafonic repaft.

Under the defignation of occult lodges, or the higher degrees of mafonry, our author comprehends all free-mafons in general, who, after having paffed the firft three degrees of apprentice, fellow-craft, and mafter, are fufficiently zealous to be admitted into the higher degrees, where, as he fays, the veil is rent afunder, where emblematical and allegorical figures are thrown afide, and where the twofold principle of equality and liberty is unequivocally explained "by war againft Chrift and his altars, war againft kings and their thrones!!!" That fuch is the refult of the grand myfteries of the craft is what he undertakes to demonftrate; and we refer thofe who are defirous of knowing or examining his proofs to his own ftatement of them.

Mafonic writers in general, fays M. Barruel, divide free-mafonry into three claffes, the Hermetic, the Cabaliftic, (comprehending the Martinifts,) and the Eclectic mafonry; all of which agree in one point, *viz.* their hatred to Chriftianity and revelation. The Hermetic mafonry, or the Scotch degrees, who work in chemiftry, have adopted Pantheifm or the true Spinozifm. With thofe who belong to this clafs "every thing is God, and God is every thing." This is their grand myftery, engraved in one word "Jehovah," on the ftone brought by the Knights-Templars from the Holy Land. The Cabaliftic mafonry was found in the Pruffian lodges of the Rofricrucians, at leaft before their union with the Illuminées; and it was adopted, we are told, by certain lodges of Roficrucians in France, a few years before the revolution, and particularly at Bourdeaux. The Jehovah of this fect is no longer the God *whole*; but he is at once the God "Sifamoro," and the God "Senamira." The firft is joined by the genius "Sallak," and the fecond by the genius "Sokak." If thefe famous Cabaliftic words are inverted, we have "Oromafis," or the God *good*, and "Arimanes," the God *evil*, and the genii will become "Kallas" and "Kakos," good and bad. Thus in attributing to Oromafis a multitude of good genii or fpirits like himfelf, and to Arimanes evil genii participating of his own wickednefs, we have the "Jehovah" of Cabaliftic mafonry; that is, the *word* to be recovered in their lodges, or the tenets to be fubftituted to thofe of Chriftianity. According to the Martinift fyftem, the God good, the God evil, and every thinking being, or, in other words, God, man, and the devil, are of the fame nature, the fame effence, and the fame fpecies. The enlightened Martinift erafes the pains of hell from his moral code, and the tendency of his political fyftem is to reduce all fociety, all legitimate authority, to that of a father governing his children; to overturn every throne, and annihilate every law but that of the ancient patriarchs. This fect is faid to have made great progrefs in France and Germany, and to have even reached England; and every where their grand object is to reprefent the French revolution as the fire which is to purify the world.

The Eclectic mafons are reprefented as much more numerous than the Martinift mafons. Thefe, after having paffed through the different degrees of mafonry, attach themfelves to no particular fyftem, either political or religious, into which they have been initiated, but adopt from them whatever may beft fuit their political or religious views. They are what they pleafe, Deifts, Atheifts, Sceptics, an aggregate of all the errors of the philofophifm of the day; with refpect to religion, they admit that equality and liberty which deny every authority but their own reafon, and reject all revealed religion; and as to governments, they admit of no kings, unlefs fubfervient to the will of the people in right of its fovereignty. Thofe who belong to a fort of Eclectic mafonry, lately eftablifhed in Germany, affert that all are independent, and have a right of making their own laws. For this reafon, they have abolifhed the names of Grand Lodge and Scotch Lodge, fo that they may be faid to have improved upon mafonic equality and liberty. Such Eclectic mafons could not have been very numerous in France, as the major part of them was under the infpection of the Grand Parifian Lodge, called the "Grand Orient." The fentiment introduced into all the Eclectic lodges, is that of hating Chrift and his religion, and detefting all fovereignty and legiflative power, except that of the people. All claffes, and every code of mafonry, Hermetic, Cabaliftic or Martinifts, and Eclectic, have concurred in forwarding the revolution; and it little imported to the fect which ftruck the blow, provided that ruin enfued.

In tracing the origin of free-mafonry, M. Barruel rejects the opinion of thofe who afcribe it to the Perfian, Egyptian, Grecian, Roman, or Druid fages; but he attributes its commencement to the Knights Templars, who were either the authors of it, or borrowed it by tradition from the ancient myfteries of Paganifm, and of its fages. According to our author's ftatement, the depofitions of the Knights Templars declare, that on their reception into the order they denied Chrift, trampled on the crofs, and fpit upon it; that Good Friday was a day particularly confecrated to fuch outrages; that they promifed to proftitute themfelves to each other for the moft unnatural crimes; that every child begotten by a Templar was caft into the fire; that they bound themfelves by oath to obey, without exception, every order from the grand-

 mafter,

master, to spare neither sacred nor profane; to look upon every thing as lawful when the good of the order was in question; and, above all, never to violate the horrible secrets of their nocturnal mysteries, under pain of the most terrible chastisements. After having traced, in various particulars, the resemblance of the free-masons to these ancient knights, our author, as if he did not think this parentage sufficiently disgraceful, traces them farther back by several centuries to Manes and the Manichees; adopting several unfounded opinions, reflecting on the Albigenses, Waldenses, &c. in the south of France. It would lead us far beyond our limits to pursue our author's declamatory reasoning, and to detail those points of resemblance which he discovers between the free-masons of the continent and those ancient heretics. If the reader has curiosity, he may consult Barruel himself.

Our author closes his account of the free-masons, as to their origin, principles, and practices, with diverting the attention of his reader to a body of men, or rather, as he calls them, a band of conspirators, who had coalesced, under the name of "Illuminées," with the Encyclopédists and masons, far more dangerous in their tenets, more artful in their plots, and more extensive in their plans of devastation. They more silently prepared the explosions of the revolutionary volcano, not merely swearing hatred to the altar of Christ and the throne of kings, but swearing at once hatred to every god, to every law, to every government, to all society and social compact; and in order to destroy every plea, and every foundation of the social contract, they proscribed the terms *mine* and *thine*, acknowledging neither equality nor liberty, but in the "entire, absolute, and universal overthrow of all property whatever."

Mason, in *Geography*, a county of Kentucky, on the S. side of Ohio river, watered by a number of creeks, which fall into Sandy river and the Ohio, and containing 11,405 inhabitants, of whom 1603 are slaves.—Also, a township in Hillsborough county, New Hampshire, on the Massachusetts line, about 70 miles W. of Portsmouth, and 50 N.W. of Boston, containing 1179 inhabitants.

Mason's *Island*, a small island in the Patowmac. N. lat. 39°. W. long. 77° 13′.

MASONRY is the art of preparing and combining stones, so as to tooth or indent them into each other, and form regular surfaces, either for shelter, convenience, or defence; as the habitations of men, animals, the protection and shelter of goods, &c.

The tools employed by the mason are different in different countries, according to the quality of the stone.

In London, the value of stone occasions it to be cut into scantlings by a saw, and the operation is done by the labourer: in different parts of the country where stone abounds, it is divided into smaller scantlings by means of wedges. Hard stone and marble are reduced to a surface by a mallet and chissel.

The principal implements used in London for hewing stones are the mallet and tools. The form of masons' tools, which are used by the percussive blows of the mallet, is that of a wedge; the cutting edge is the vertical angle. The material out of which such tools are made is iron, except the end which enters the stone, which is of steel. The end of the tool which is struck by the mallet is a small portion of a spheric surface, and projects on all sides beyond the adjoining part or hand hold, which increases in magnitude towards the middle of the tool, and thence tapers forward, in the form of a wedge or pyramid, to the entering or cutting edge. The other tools used by the mason are, a level, a plumb rule, a square, a bevel, and rules both straight and circular, of various descriptions, for trying the surfaces in the progressive state of the work.

The tools used in London, in succession, to work the face of a stone, are, the point, the inch tool, the boaster, then the broad tool. The operation of working with the point is called *pointing*, and that with the boaster is called *boasting*. The operation of the point leaves the surface in narrow furrows, with rough ridges between them. The inch tool is used in cutting away the ridges, and the boaster in making the surface of the work nearly smooth. The point is in breadth, at the entering part, from $\frac{1}{4}$th to $\frac{3}{8}$ths of an inch, the boaster 2 inches wide, and the broad tool $3\frac{1}{2}$ inches at the cutting edge. In the use of the tool, the cutting edge is always perpendicular to the same side of the stone. There are two kinds of operations performed by it: suppose the impression made by the whole breadth of the tool, at the cutting edge, to be called a cavity. In one operation, the successive cavities follow one another in the same straight line, until the breadth or length of the stone is exhausted; then successive equidistant parallel lines are repeated in the same manner, until the whole surface of the stone has been gone over by the tool. This manner of hewing is called *stroking*, which is a kind of fluted surface. In the other operation, every successive cavity is repeated in new equidistant lines throughout the length or breadth of the stone, then a new series of cavities is again repeated throughout the length or breadth of the stone, and thus until the whole breadth or length of the stone is exhausted. This mode is called *tooling*.

Tools for working cylindrical and conical parts of mouldings are of all sizes, from $\frac{1}{4}$th part of an inch upwards; but those for working convex mouldings are generally half an inch broad, unless in confined spaces, where such breadth cannot be admitted.

A stone is taken, for the greater part, out of winding with points, and entirely with the inch tool.

In London, the facings of buildings made with squared stone, are either stroked, tooled, or rubbed.

In the country, where the saving of stone by the use of the saw is not a compensation for the loss of time taken up in sawing, the operation is entirely performed by the mallet and chissel.

When stones are very unshapely previous to the operation of hewing, a stone ax, jedding ax, scabbling hammer, or cavil, is used in order to bring the stone nearly to a shape: one end of the jedding ax is flat, and is used for knocking off the very protuberant angular parts when less than right angles, the other end is pointed for reducing the different surfaces nearly to the intended form.

In some parts of the country, different fancies of hewn surfaces are indulged, as herring-bone work: this is forming the surfaces of the stones by zig-zag lines parallel to each other.

In Scotland, besides what has already been noticed in hewn work, are other kinds denominated droved, broached, and striped. Droving is the same as that called random tooling in England, or boasting in London; and the chissel for broaching is called a punch, and is the same as that called a point in England. Broached work is first droved and then broached, as the work cannot be done regularly at once with the punch. Striped work must also be first droved and then striped. Hence, of these three kinds of surfaces, the droved is the cheapest. Though broaching is sometimes performed without droving, it is never so regular; and besides, the surface is generally full of inequalities. It must be observed, however, that workmen in general do not take the same pains to drove the face of a stone which is to be afterwards broached, as in that of which the droving is to remain the

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final finish: these should be noticed by the superintendant. Droving, broaching, and striping, are the terms used in Edinburgh and Glasgow, and in the south of Scotland. In Aberdeen, where the stone is very hard, being a kind of granite, the same operations cannot be employed. Instead of them they use a scabbling hammer, by which they pick the stone until the surface has nearly acquired its intended form. This manner of dressing the surface for the stone facing of a building is called *nidged work*, and the operation *nidging*. The term rubbed work is applied where the surface is smoothed by means of sand or grit stone.

Various curved rules, or templets and guages, are also employed in hewn work. The tools used in setting or building are, a line and line pins, the level, the plumb rule, and rules of various descriptions, as also templets for circular work.

Marbles are polished by first being rubbed with grit-stone, then with pumice-stone, and lastly with emery or calcined tin.

The chief stone used in London is Portland, which comes from the island of Portland in Dorsetshire. It is used for public edifices, not only in ornaments, mouldings, and strings, but in all the exterior parts. In private buildings, where brick-work predominates, it is used in strings, window sills, balusters, steps, copings, &c. It must be observed, however, that under a great pressure it is apt to splinter or flush at the joints, and for this reason the joints cannot be made so close as many other kinds of stone will admit of. When it is recently quarried it is soft, and works easily, but acquires great hardness in length of time. The cathedral of St. Paul, Westminster bridge, and almost every public edifice in London, are constructed wholly, or in part, of Portland stone.

Purbeck stone comes from the island of Purbeck, in Dorsetshire also. It is mostly employed in rough work, as steps and paving.

Yorkshire stone is used where strength and durability are requisite, as in paving and coping.

Ryegate stone is used for hearths, slabs, and copings.

In Edinburgh a very fine stone called Craigleith, brought from a village of the same name in the neighbourhood of this city, is that most commonly used in the construction of their edifices. They have also very good stone from the Hails quarry, but rather inferior in point of colour.

This Craigleith quarry produces two kinds of rock, one of a fine cream or buff colour, called the liver rock, which is almost unchangeable, even though exposed in a building to the weather.

The city of Glasgow is built of various kinds of stone, the best of which are, the Possel and the Lord President's quarry: most other kinds are not only perishable, but liable to change their colour.

In the north of England, stone fit for hewn work is chiefly of a reddish colour. There is a very good white stone, however, in the vicinity of Liverpool, of which several of the public buildings are constructed.

All the stone fit to be squared, or squared and rubbed smooth, for the use of building, is mostly composed of sand. The stone used for the same purpose in the south of England is, in some parts, entirely chalk, and in other parts limestone. The Bath and Oxfordshire stone has so little grit in its texture, as to be wrought into mouldings with planes, as in joinery, and the surfaces are finished with an instrument called a *drag*.

Marbles, with regard to their contexture and variegation of colour, are almost of infinite variety: some are black, some white, some of a dove colour, and others beautifully variegated with every kind of rich colour. The best kind of white marble is that called statuary, and when cut into thin slices becomes almost transparent, which property the others do not possess. The texture of marble, with regard to working, is not generally understood even by the best workmen, though upon sight they frequently know whether it will receive a polish or not. Some marbles are easily wrought, some are very hard, and other kinds resist the tools altogether.

Mortar is another principal material used in cementing the stones of a building. The reader who wishes to obtain a full knowledge in this department of masonry, may consult the article CEMENT, where he will receive satisfactory information

Wherever it is intended to build upon, the ground must be tried with an iron crow or with a rammer: if found to shake it must be pierced with a borer, such as is used by well diggers; and if the ground proves to be generally firm, the loose or soft parts, if not very deep, must be excavated until a solid bed appears.

If the ground proves soft in several places to a great depth under apertures, and firm upon the scite of the piers, turn inverted arches under the apertures, so that if the foundation sink, the arches will resist the re-action of the ground, then the whole wall will sink uniformly or descend in one body. Should the ground be even of an uniform texture, it is always eligible to turn inverted arches under apertures, wherever there is a part of a wall carried up from the foundation to the sill of that aperture: it is from neglecting this circumstance that the sills of windows in the ground stories of buildings are frequently broken; indeed it is seldom or never otherwise.

Arches adequate to this purpose should rather be of a parabolic form than circular, the figure of the parabola being better adapted to preserve an equilibrium than the arc of a circle, which is of uniform curvature. If unfortunately the soft parts of the ground prove to be the scite of the piers, and, consequently, the hard places under the apertures, build piers under the apertures, and suspend arches between the piers with their concave side towards the trench as usual.

For more information upon this subject, the reader will refer to the article FOUNDATION.

In walling, the bedding joints have most commonly a horizontal position in the face of the work, and this disposition ought always to take place when the top of the wall terminates in an horizontal plane or line. In bridge building, and in the masonry of fence walls upon inclined surfaces, the bedding joints on the face sometimes follow the upper surface of the wall or terminating line.

The footings of stone walls ought to be constructed of large stones, which, if not naturally nearly square, should be reduced by the hammer to that form, and to an equal thickness in the same course; for if the beds of the stones in the foundation taper, the superstructure will be apt to give way, by resting upon mere angles or points with inclined beds instead of horizontal. All the vertical joints of any upper course should break joint, that is, they should fall upon the solid part of the stones in the lower course, and not upon the joints.

When the walls of the superstructure are thin, the stones which compose the foundation may be so disposed that their length may reach across each course, from one side of the wall to the other. In thicker walls, where the difficulty is greater in procuring stones of sufficient length to reach across the foundation, every second stone in the course may be a whole stone in the breadth, and each interval may consist of two stones of equal breadth, that is, placing header and stretcher alternately. But when those stones cannot be had

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conveniently, from one ſide of the wall lay a header and ſtretcher alternately, and from the other ſide lay another ſeries of ſtones in the ſame manner, ſo that the length of each header may be two-thirds, and the breadth of each ſtretcher one-third of the breadth of the wall, and ſo that the back of each header may come in contact with the back of an oppoſite ſtretcher, and the ſide of that header to come in contact with the ſide of the header adjoining the ſaid ſtretcher. In broad foundations, where ſtones cannot be procured for a length equal to two-thirds of the breadth of the foundation, build the work ſo that the upright joints of any courſe may fall on the middle of the length of the ſtones in the courſe below, and ſo that the backs of each ſtone in any courſe may fall upon the ſolid of a ſtone or ſtones in the courſe below.

The foundation ſhould conſiſt of ſeveral courſes, of which each ſuperior courſe ſhould be of leſs breadth than the inferior one, ſay four inches on each ſide in ordinary caſes, and the upper courſe project four inches on each ſide of the wall. The number of courſes muſt be regulated by the weight of the wall, and by the ſize of the ſtones of which the foundation conſiſts.

A wall which is built of unhewn ſtone is called a *rubble* wall, whether with or without mortar. Rubble work is of two kinds, courſed and uncourſed. Courſed rubble is that of which the ſtones are guaged and dreſſed by the hammer, and thrown into different heaps, each heap containing ſtones of the ſame thickneſs; then the maſonry is laid in courſes or horizontal rows, which may be of different thickneſſes. The uncourſed rubble is that where the ſtones are laid promiſcuouſly in the wall, without any attention to placing them in rows. The only preparation which the ſtones undergo, is that of knocking off the ſharp angles with the thick end of the ſcabbling hammer.

Walls are moſt commonly built with an aſhler facing and backed with brick or rubble work. Brick backings are common in London where brick is cheaper, and ſtone backing in the north of England and in Scotland where ſtone is cheaper. Walls faced with aſhler, and backed with brick or uncourſed rubble, are liable to become convex on the outſide from the greater number of joints, and from the greater quantity of mortar placed in each joint, as the ſhrinking of the mortar will be in proportion to the quantity, and therefore a wall of this deſcription is much inferior to one of which the facing and backing are of the ſame kind, and built with equal care, even though both ſides were uncourſed rubble, which is the worſt of all walling. Where the outſide of a wall is an aſhler facing and the inſide courſed rubble, the courſes of the backing ſhould be as high as poſſible, and ſet with thin beds of mortar. In Scotland, where ſtone abounds, and where perhaps as good aſhler facings are conſtructed as any in Great Britain, the backing of their walls moſt commonly conſiſts of uncourſed rubble, built with very little care. In the north of England, where the aſhler facings of walls are done with leſs neatneſs, they are much more particular in courſing of their backings. Courſed rubble and brick backings are favourable for the inſertion of bond timbers: but in good maſonry wooden bonds ſhould never be in continued lengths, as in caſe of fire or rot the wood will periſh, and the maſonry, being reduced by the breadth of the timber, will be liable to bend at the place where it was inſerted. When it is neceſſary to have wall timber for the faſtening of battens for lath and plaſter, the pieces of timber ought to be built with the fibres of the wood perpendicular to the ſurface of the wall, or otherwiſe in unconnected ſhort pieces not exceeding nine inches in length.

In an aſhler facing the ſtones generally run from twenty-eight to thirty inches in length, twelve inches in height, and eight or nine inches in thickneſs. Although both the upper and lower beds of an aſhler, as well as the vertical joints, ſhould be at right angles to the face of the ſtone, and the face bed and vertical joints at right angles to the beds in an aſhler facing, where the ſtones run nearly of the ſame thickneſs, it is of ſome advantage, in reſpect of bond, that the back of the ſtone be inclined to the face, and that all the backs thus inclined ſhould run in the ſame direction, as this gives a ſmall degree of lap in the ſetting of the next courſe; whereas if the backs were parallel to the front, there could be no lap where the ſtones run of an equal depth in the thickneſs of the wall. It is of ſome advantage likewiſe to ſelect the ſtones, ſo that a thicker one and a thinner one may follow each other alternately. The diſpoſition of the ſtones in the next ſuperior courſe, ſhould follow the ſame order as in the inferior courſe, and every vertical joint ſhould fall as nearly as poſſible in the middle of the ſtone below.

In every courſe of aſhler facing, with brick or rubble backing, *through* ſtones (as they are technically termed) ſhould be introduced, and their number ſhould be proportioned to the length of the courſe, and every ſuch ſtone of a ſuperior courſe ſhould fall in the middle of every two like ſtones in the courſe below: this diſpoſition of bonds ſhould be ſtrictly attended to in all long courſes. Some wallers, in order to ſhew or demonſtrate that they have introduced ſufficient bonds in their work, chooſe their bond ſtones of greater length than the thickneſs of the wall, and knock or cut off their ends afterwards. This method is far from being eligible, as the wall is not only liable to be ſhaken by the force applied to break the end of the ſtone, but the ſtone itſelf is apt to be ſplit.

In every pier where the jambs are courſed with the aſhler in front, every alternate jamb ſtone ought to go through the wall with its beds perfectly level. If the jamb ſtones are of one entire height, as is frequently the caſe when architraves are wrought upon them, and upon the lentil crowning them, in the ſtones at the ends of the courſes of the pier which are to adjoin the architrave jamb, every alternate ſtone ought to be a through ſtone; and if the piers between the apertures be very narrow, no other bond ſtones will be neceſſary in ſuch ſhort courſes. But where the piers are wide, the number of bond ſtones muſt be proportioned to the ſpace: through ſtones muſt be particularly attended to in the long courſes below and above windows.

Bond ſtones ſhould have their ſides parallel and of courſe perpendicular to each other, and their horizontal dimenſion in the face of the work ſhould never be leſs than the vertical one. All the vertical joints, after receding about three quarters of an inch from the face with a cloſe joint, ſhould widen gradually to the back, and thereby form hollow wedge-like figures for the reception of mortar and packing. The adjoining ſtones ſhould have their beds and vertical joints filled with oil putty from the face to about three quarters of an inch inwards, and the remaining part, of the beds with well prepared mortar. Putty cement will ſtand longer than moſt ſtones, and will even remain prominent, when the ſtone itſelf is in a ſtate of dilapidation, by the influence of the corroding power of the atmoſphere. It is true that in all newly built walls cemented with oil putty, the firſt appearance of the aſhler work is rather unſightly, owing to the oil of the putty diſſeminating itſelf into the adjoining ſtones, which makes the joints appear dirty and irregular: but this diſagreeable effect is removed in a year, or leſs; and if care has been taken to make the colour of the putty ſuitable to that of the ſtone, the joints will hardly

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appear, and the whole work will seem as if one piece. This is the practice of Glasgow. In London and Edinburgh fine water putty is used instead of it.

All the stones of an ashler facing should be laid on their natural beds. From a neglect of this circumstance the stones frequently flush at the joints, and this disposition of the lamina sooner admits the corroding power of the atmosphere to take place.

In building walls or insulated pillars of very small horizontal dimensions, every stone should have its beds level and without any concavity in the middle: because if the beds are concave, when the pillars begin to sustain the weight of the fabric the joints will in all probability flush. It ought likewise to be observed that every course of masonry of such piers ought to consist of one stone.

Vitruvius has left us an account of the construction of the walls of the ancients, as follows. "The sorts of walls are the reticulated, *Plate* I. *fig.* 1, and the ancient, which is called the incertain, *fig.* 2. Of these the reticulated is the handsomest, but the joints are so ordered that all the parts of the courses have an infirm position; whereas in the incertain, the materials rest firmly one upon the other, and are interwoven together; so that they are much stronger than the reticulated, though not so handsome. Both sorts are formed of very small pieces, that the walls, being saturated with mortar, may endure the longer: for the stones, being of a porous and spungy nature, absorb the moisture from the mortar; and when there is an abundance of mortar, the wall, having more humidity, will not so soon decay, but will on that account be rendered more durable; for as soon as the humidity is extracted from the mortar by the suction of the stones, then the lime and sand separating the cement is dissolved, and the mortar no longer uniting the materials, the walls soon become ruinous. Th s may be observed in some tombs near the city, which are built with marble or hewn stone, and the internal parts rammed with rubble stones; the mortar being by length of time drained of its humidity by the suction of the stones, and the union of the joints being dissolved, they separate and fall to ruin.

"To avoid this error, the middle space (*fig.* 2.) must be strengthened with abutments of the red hewn stone or bricks, or common flints, built in walls two feet thick, and bound to the front with cramps of iron fixed with lead; for the work being thus built in a regular manner, and not laid in promiscuous heaps, will remain without defect; and being by the orderly arrangement of the courses and joints firmly united and bound together, it will not be liable to fractures, nor will the abutments suffer it to fall to decay. For this reason the walls of the Greeks are not to be despised; for though they do not use smooth or polished materials, yet where they discontinue the square stones, they lay the flints, or common hard stones, that they use, in the same manner as bricks are generally laid, bending the courses together with alternate joints, and thus make their works strong and durable.

"These walls they build in two manners; one is called *Isodomum* (*fig.* 3.), and the other *Pseudisodomum* (*fig.* 4.) Isodomum is when all the courses are of an equal thickness; and Pseudisodomum when they are unequal. Both these sorts are firm; first, because the stones themselves are of a compact and solid nature, and do not absorb the moisture from the mortar, but preserve its humidity to a great age; and, secondly, being situated in regular and level courses, the mortar is prevented from falling, and the whole thickness of the wall being united, it endures perpetually.

"Another sort is that which they call Emplecton, *fig.* 5 and 6.) which is also used by our villagers. The faces of the stones in this kind are smooth; the rest is left as it grows in the quarry, being secured with alternate joints and mortar; but our artificers, quickly raising a shell, which serves for the faces of the wall, fill the middle with rubble and mortar: the walls, therefore, consist of three coats, two being the faces, and one the rubble core in the middle, *figs.* 5 and 6. But the Greeks do not build in that manner; they not only build the facing courses regularly, but also use alternate joints throughout the whole thickness, not ramming the middle with rubble, but building it the same as the face, and of one united coat construct the wall: besides this, they dispose single pieces (A), which they call diatonos, in the thickness of the wall, extending from one face to the other, which bind and exceedingly strengthen the walls. Those, therefore, who would build works of long duration, must attend to these rules, and make use of such methods of building; for the smooth polish, and beautiful appearance of the stones, will not prevent the wall from being ruined by age."

An arch, in masonry, is a part of a building suspended over a given plan, supported only at the extremities, and concave towards the plan.

The supports of an arch are called the *spring walls*.

The whole of the under surface of the arch opposite to the plan is called the *intrados* of the arch, and the upper surface is called the *extrados*.

The boundary line, or lines of the intrados, or those common to the supports and the intrados, are called the *springing lines* of the arch.

A line extending from any point in the springing line on one side of the arch, to the springing line on the opposite side of the arch, is called the *chord* or *span* of the arch.

If a vertical plane be supposed to be contained by the span and the intrados of the arch, it is called the section of the hollow of the arch.

The vertical line drawn on the section from the middle of the spanning line to the intrados, is called the *height* of the arch, as also the middle line of the arch, and the part of the arch at the upper extremity of this line is called the *crown* of the arch.

Each of the curved parts on the top of the section, between the crown and each extremity of the spanning line, is called the *haunches* or *flanks* of the arch.

The section of almost every given arch used in building has the following properties: the upper part is one continued curve, concave towards the span, or two curves forming an interior angle at the crown, both concave towards the spanning line.

Every two vertical lines on the section equidistant from each extremity, and parallel to the middle line, are equal.

The above definitions and propositions not only apply to arches with level bases, but also to arches which stand upon inclined bases.

When the base of the section or spanning line is parallel to the horizon, the section will consist of two equal and similar parts, so that if one were conceived to be folded upon the other, the boundaries of both would coincide.

Arches, the intrados of which is the surface of a geometrical solid that would fill the void, are variously named, according to the figure of the section of that solid perpendicular to the axis, as *circular*, *elliptical*, *cycloidal*, *catenarian*, *parabolical*, &c.

Arches of the circular kind have two distinctions, *viz.* the semicircle, and those of segments less than a semicircle, are called *scheme* or *skene* arches.

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There are alſo *pointed*, *compoſite*, *lancet*, or *Gothic* arches, which are formed in the face of the wall, or in ſections parallel thereto, with the intrados of the arch.

When the extremities of an arch riſe from ſupports at unequal heights, ſuch an arch is called a *rampant* arch.

When a vertical line is drawn upwards, through each extremity of the ſpanning line, ſo as to cut off equal and ſimilar parts of the intrados, the arch is called a *horſe-ſhoe* arch, or *Moreſque* arch. Hence, in this kind of arch, the ſpanning line is leſs than any other line or chord drawn parallel to the ſpan, but under the top of each ſaid vertical line.

When the upper line or ſide of an arch is parallel to the under line or ſide, the arch is called an *extradoſſed* arch.

A ſimple vault is an interior concavity extended over two parallel oppoſite walls, or over all the diametrically oppoſite parts of one circular wall. An arch or vault are frequently underſtood as ſynonimous; but the diſtinction which we ſhall here obſerve is, that an arch, though it may be extended over any ſpace, has a very narrow intrados, not exceeding four or five feet; whereas a vault may be extended to any limit more than four or five feet. Thus, we frequently ſay an arch in a wall, but we never ſay a vault in a wall; though nothing is more common than to ſay a vaulted apartment, a vaulted room, a vaulted cellar, &c. So that a vault, as ſir Henry Wotton has obſerved, is an extended arch; we ſhall therefore apply arch to the head of the aperture in a wall which ſhews curvilineal interſections with the faces of the wall, and the word vault to arched apartments. We frequently, however, call the ſtone-work ſuſpended over an apartment an arch as well as a vault, ſo that every vault is an arch, but every arch is not a vault.

The intrados of a ſimple vault is generally formed of the portion of a cylinder, cylindroid, ſphere, or ſpheroid, never greater than the half of the ſolid; and the ſpringing lines which terminate the walls, or where the vault begins to riſe, are generally ſtraight lines parallel to the axis of the cylinder or cylindroid, or the circumference of a circle or ellipſe.

A circular wall is generally terminated with a ſpherical vault, which is either hemiſpherical, or a portion of the ſphere leſs than a hemiſphere.

A vaulted apartment, ſurrounded by an elliptic wall, is generally covered with a ſpheroidal vault, which is either a hemiſpheroid, or a portion leſs than a hemiſpheroid.

A conic ſurface is ſeldom employed in vaulting; but when the vault is to have this kind of intrados, the intrados ſhould be the half of a cone with its axis in a horizontal poſition, or a whole cone with its axis in a vertical poſition.

All vaults which have a horizontal ſtraight axis are called ſtraight vaults.

Beſides what we have already denominated an arch, the concavities which two ſolids form at an angle are called an arch.

If one cylinder pierce another of a greater diameter, the arch is called a cylindro-cylindric arch; the cylindro being applied to the cylindric part which has the greater diameter, and the cylindric to that which has the leſs.

If a cylinder pierce a ſphere of greater diameter than the cylinder, the arch is called a ſphero-cylindric arch; and on the contrary, if a ſphere pierce a cylinder of greater diameter than the ſphere, the arch is denominated a cylindro-ſpheric arch.

If a cylinder pierce a cone ſo as to make a complete perforation through the cone, two complete arches will be formed, called cono-cylindric arches; and on the contrary, if a cone pierce a cylinder ſo as to make the interior concavity through the cylinder a complete conic ſurface, the arch is called a cylindro-conic arch.

If a ſtraight wall be pierced with a cylindric aperture quite through, two arches will be formed, called plano-cylindric arches.

Every ſpecies of arches is thus denoted by two preceding words; the former ending in *o*, ſignifying the principal vault or ſurface cut through, and the latter in *ic*, ſignifying the kind of aperture which pierces the wall or vault.

When two cylindric vaults, or two cylindroidic vaults, or a cylindric and cylindroidic vault pierce each other, and alſo their axes, ſo that the diameter of each hollow may be the ſame when meaſured perpendicular to a plane paſſing through the axis of both ſurfaces, the figure ſo formed is called a groin: but for more particular information on this point, ſee the article Groin.

The formation of ſtone arches, in various caſes, has always been looked upon as a moſt curious and uſeful acquiſition to the operative maſon, or to the architect, or other perſon who is appointed to ſuperintend the work. In order to remove the difficulties experienced in the conſtruction of cylindric or cylindroidic arches, both in ſtraight and circular walls, we ſhall here ſhew an example of each:

Firſt, let it be required to conſtruct a ſemi-cylindroidic arch cutting a ſtraight wall with its axis oblique to the ſurface of the wall, but parallel to the horizon.

Let A B C D (*Plate* II. *fig.* 1.) be the plan of the aperture, A D and B C being the plan of the jambs; and A B and D C the plan of the ſides of the wall: produce D A and C B to G and F: draw the ſtraight line I G M F E at right angles with A G and C F: biſect G F at M: draw M H K perpendicular to G F: make M H equal to the height of the intrados of the arch, and deſcribe the ſemi-ellipſis G H F, which is the ſection of the intrados of the arch: make G I, H K, and F E equal to the breadth of the beds of the arch ſtone, and deſcribe the ſemi-ellipſis I K E, which is the ſection of the extrados of the arch. Now ſuppoſe the diſtances between the joints around the intrados of the arch to be all equal, and all the joints to tend to the centre M; divide the ſemi-ellipſis into ſuch an odd number of equal parts, that each part may be in breadth equal to what is intended for the thickneſs of the ſtones at that part; produce E I to S, and extend the whole number of theſe parts from G to S; and through the points of diviſion draw lines perpendicular to G S, or parallel to A G. Through all the points of diviſion of the ellipſis G H F, draw lines parallel to G A to meet A B; then take the lengths of all the parts of the lines ſo drawn that are terminated by G F and A B as follows: *viz.* make the firſt line on the left of G A equal to the firſt on the right of G A, and the point *b* will be obtained; and the ſecond on the left of G A equal to the ſecond on the right of G A, and the point *c* will be obtained: proceed in this manner until all the other points are obtained; then a curve being drawn through all the points A, *b*, *c*, *d*, &c. to T, will give the one edge of the envelope of the intrados of the arch; and by producing the perpendiculars erected upon G S to the points *e*, *f*, *g*, &c. and making the ſeveral diſtances *b e*, *c f*, *d g*, &c. equal to A D or B C, the points D, *e*, *f*, *g*, &c. to U, will give the other edge of the envelope by tracing a curve through them; then A *b e d*, *b c f e*, *c d g f*, &c. are the ſoffits of the ſtones.

To

To find any bevel which the joints on the face of the arch makes with that on the intrados of the same. Let $p\,q$ be one of the joints tending to the centre M of the section of the arch: with the radius M G describe an arc G N O, cutting $p\,q$ at N: draw N P parallel to G A, cutting A B at P: draw P Q parallel to F G, cutting G A at Q: draw M L parallel to G A, cutting A B at L, and join L O; then Q L M is the bevel required: in the same manner may all the remaining bevels be found.

Again, let $p\,q\,r\,s$ be the section of an arch stone, then making two bevels, one to $q\,p\,s$ and the other to $r\,s\,p$, will be all the bevels that are necessary for that stone. Having obtained the several bevels, we shall now proceed to work the arch stone, whose section is $p\,q\,r\,s$: first work the lower bed of the stone corresponding to the joint $p\,q$, then draw a line for the soffit, which work also by means of the bevel $q\,p\,s$; then guage the soffit to its breadth, and work the upper bed of the stone by means of the bevel $r\,s\,p$; then take the soffit mould from the envelope, and draw the ends of the stone which coincides with the faces of the wall; then with the face bevels Q L M, and V L M, work the face of the stone.

Note, that finding the bevels for half the arch will be sufficient by reversing them.

The other arch standing upon D C shews the ends of the stones in the face of the wall; its boundaries are two ellipses of equal height to those of the section.

To construct a cylindro-cylindric arch, or a cylindric arch in a cylindric wall, the axis of the aperture being at right angles with the axis of the cylindric wall. Let A B C D be the half plan of the wall, B C being half of the convex curve, A D half of the concave curve, C D the middle line of the aperture tending to the centre of the concentric circles which form the plan, and A B parallel to C D, being the jamb. Through C draw E F perpendicular to C D: make C E and C F half the breadth of the aperture: from the centre C, with the radius C E or C F, describe the semicircle E G F, which will be the section of the intrados: produce C E and C F to H and I, making E H and F I each equal to the breadth of the beds, and describe the semicircle H K I: divide the intradossal curve E G F into the number of parts answering to the number of arch stones, and proceed to find the envelope, as described, for the straight wall, which will give the moulds for the soffits of the stones as before.

To find the curves of the ends of the beds upon the face of the arch. Let L M represent a joint: draw L N and M O perpendicular to H I, cutting the plan of the wall at N and O: draw N P parallel to C I, cutting M O at P: in L M take any number of points t and y, and draw $t\,s$ and $y\,w$ parallel to L N, cutting the plan at s and w, and N P at r and v: draw M Q, $t\,u$, $y\,x$, perpendicular to L N: make M Q, $t\,u$, $y\,z$, respectively equal to P O, $r\,s$, $v\,w$, and L x u Q will be the curve of the joint required, which gives the face line of the upper bed of the lower stone, and the face line of the lower bed of the upper stone. In the same manner all the other face lines of the beds are to be found. The templet must be cut in the shape of L M Q.

To form an arch stone. First make one of the beds, then make the soffit, then form the other bed, then form the face lines of each bed, then run a draught round the three face lines, then between these work the face of the stone in lines perpendicular to the horizon. This will be easily found by drawing a vertical line upon the section of each stone.

It is only necessary to draw the moulds for one half of the arch, as the reversing of them in their application gives the stones of the other half.

The joints of any arch whatever may be found in the same manner, provided that the planes of the beds intersect a vertical plane perpendicular to the curve in the middle of the aperture.

It is obvious, on finding the face lines of the beds, that the lowest face line is the quickest, and part of the plan of the wall itself; the next face line is flatter, or has less curvature, and thus each successive face line has less curvature as it comes nearer to the top, and if there were a joint in the top, the face line of the beds would be quite a straight line. Indeed, the face lines of two or three courses might be wrought with straight edges, as the difference could hardly be perceived.

MASORA, a term in the *Jewish Theology*, signifying a work on the bible, performed by several learned rabbins, to secure it from alterations which might otherwise happen.

Their work regards merely the letter of the Hebrew text; in which they have, first, fixed the true reading, as well as the right method of writing and pronouncing, by vowels, pauses, and accents: they have, secondly, numbered not only the chapters and sections, but the verses, words, and letters of the text: and they find in the Pentateuch 5245 verses, and in the whole bible 23,206. The masora is called, by the Jews, the hedge or fence of the law, because this enumeration of the verses, &c. is a means of preserving it from being corrupted and altered. They have, thirdly, marked whatever irregularities occur in any of the letters of the Hebrew text; such as the different size of the letters, their various positions and inversions, &c. and they have been fruitful in finding out reasons for these irregularities and mysteries in them. (See CABBALISTS.) They are, fourthly, supposed to be the authors of the Keri and Chetibh, or the marginal corrections of the text in our Hebrew bibles. See KERI-CHETIB.

The text of the sacred books, it is to be observed, was originally written without any breaks, or divisions into chapters or verses, or even into words; so that a whole book, in the ancient manner, was but one continued word; of this kind we have still several ancient manuscripts, both Greek and Latin. In regard, therefore, the sacred writings had undergone an infinite number of alterations, whence various readings had arisen, and the original was become much mangled and disguised, the Jews had recourse to a canon, which they judged infallible, to fix and ascertain the reading of the Hebrew text; and this rule they call *masora, tradition*, from מסר, *tradidit*, as if this critique were nothing but a tradition which they had received from their fore-fathers. Accordingly they say, that when God gave the law to Moses, at Mount Sinai, he taught him, first, the true reading of it, and, secondly, its true interpretation; and that both these were handed down by oral tradition, from generation to generation, till at length they were committed to writing. The former of these, *viz.* the true reading, is the subject of the masora; the latter, or true interpretation, that of the *mishna* and *gemara*; which see.

According to Elias Levita, they were the Jews of a famous school at Tiberias, about 500 years after Christ, who composed, or at least began, the masora; whence they are called masorites, and masoretic doctors. Aben Ezra makes them the authors of the points and accents in the Hebrew text, as we now find it; and which serve for vowels.

It is pretended by those who lay a great stress on the points, that the same word, being written with consonants only, as most of the Hebrew words are, has various significations, according to the vowels with which you read or pronounce

nounce it ; *e. g.* the three letters דבר, *d b r*, have at leaſt five different ſignifications, *viz.* he ſpake, ſpeaking, a word, a peſtilence, and a fold for ſheep or cattle. Whilſt the Hebrew was a living language, there is no doubt that the word compoſed of theſe three letters was underſtood in its different ſignifications by the different vowels that were uſed in it when they uttered it. Such vowel points, the Maſorites have now affixed to it, by which we may know when and where theſe three letters ſignify one thing and when another. When it ſignifies "he ſpake," they affix the points which denote *a* ſhort and *e* long, and ſay דבר, *daber*. When it is a participle, and ſignifies "ſpeaking," they read by their points דבר, *dober* ; when it is a noun, and ſignifies a "word," they put under it two *a*'s ſhort, and read דבר, *dabar*, when it ſignifies a peſtilence, they put two *e*'s under, and read דבר, *deber*, when it ſignifies a fold, they put the points which denote *a* and *e*, and read it דבר ; and ſo they have done with other words.

What has been done, in this caſe, by the Maſorites, would certainly be of great uſe for underſtanding the Hebrew text, if they had lived while the Hebrew was a living language, and theſe points had been then uſed, and we could have been aſſured of their knowledge of the true pronunciation of all words, according to their different ſignifications ; but as the Hebrew was a dead language many hundred years before this time, the true ancient pronunciation was as much unknown then as now. We have St. Jerome's teſtimony, that different vowels were uſed in the pronunciation of the ſame word in different countries ; and this was at leaſt 100 years before the Maſorites *began* the invention of their points, either for vowel, pauſe, or accent ; and they were improving for ſome centuries. It is alſo manifeſt, from the LXX, that the ancient Jews read with different vowels from thoſe which the Maſorites have affixed. This is amply evinced by Maſclef in his "Grammar." But if nothing more than the bare pronunciation of Hebrew words was concerned in the caſe, the matter would not be worth the leaſt diſpute. We know not how the ancient Greeks and Romans pronounced the Latin and Greek tongues. Every nation now gives the ſame ſound to the Latin and Greek letters, which they give to thoſe of their own language, which occaſions thoſe languages to be differently pronounced by different people. However, all write and interpret them in the ſame manner ; which difference in pronouncing or ſpeaking is of little conſequence, but the caſe is different with regard to the Hebrew ; moſt of the words in that language are written without vowels ; and the queſtion is, what vowels the words require to make the ſenſe underſtood ; not how the words are to be pronounced in ſpeaking, when vowels are affixed to them. Therefore we ſay, that as it appears from the LXX, that the Jews, before our Saviour's time, uſed other vowels, by which they ſpake their words, than thoſe which the Maſorites have uſed ; the conſequence is, that the points which the Maſorites have now affixed to every Hebrew letter, whether for vowel, pauſe, or accent, are of little or no authority, and deſerve not to be regarded by us ; and that the true ſenſe of an Hebrew word, written only with conſonants, is not to be filched from the points of the Maſora, and the rules given concerning them, but from the context and conſtruction, and the aſſiſtance of the LXX, and other ancient tranſlations. Although we cannot charge the Jews with wilful falſification of the Hebrew text, that is, they have not deſignedly changed the letters of their bibles, yet we cannot ſay that they have not in ſome places wilfully falſified the ſenſe by their points, of which Maſclef gives us an inſtance in his arguments for his "New Grammar," with regard to the famous prophecy in Gen. xlix The learned Mr. Johnſon of Cranbrook, in a poſthumous diſcourſe on Daniel's 70 weeks, has alſo obſerved how the Maſorites have endeavoured to marr that prophecy alſo, by their points ; putting a ſtop, which they call an "athnach," which anſwers to our ſemicolon, in the place where there ought to have been only a comma. And, as Mr. Johnſon obſerves, our Engliſh tranſlators took the preſent Hebrew text as it is printed by the Maſorites, to be the only ſenſe and meaning of the Old Teſtament. In Dan. ix. 25. they put their "athnach" or ſemicolon after the ſeven weeks, and thus cutting off the ſeven weeks from the three ſcore and two weeks, make the prophecy wholly unſerviceable to Chriſtians ; but if they had placed a comma after ſeven weeks, and their "athnach" or ſemicolon after three ſcore and two weeks, the number of years, *viz.* 483 (69 weeks) would exactly point out the time when the Chriſtian Meſſiah came. See Points, under which article this ſubject is farther diſcuſſed.

The age of the Maſorites has been much diſputed. Archbiſhop Uſher places them before Jerome ; Capel, at the end of the fifth century ; father Morin in the tenth century ; Dr. Kennicott about the year 800 ; Baſnage ſays, that they were not a ſociety, but a ſucceſſion of men ; and that the maſora is the work of many grammarians, who, without aſſociating and communicating their notions, compoſed this collection of criticiſms on the Hebrew text. It is urged, that there were Maſorites from the time of Ezra and the men of the great ſynagogue, to about the year of Chriſt 1030 ; and that Ben Aſcher of Tiberias, and Ben Naphtali at Babylon, who were the beſt of the profeſſion, and who, according to Baſnage, were the inventors of the maſora, flouriſhed at this time. Each of theſe publiſhed a copy of the whole Hebrew text, as correct, ſays Dr. Prideaux, as they could make it. The eaſtern Jews have followed that of Ben Naphtali, and the weſtern that of Ben Aſcher ; and all that has been done ſince is to copy after them, without making any more corrections or maſoretical criticiſms.

The learned Walton, in the appendix to his Polyglott, has given us all the various readings of Ben Aſcher and Ben Naphtali and the Oriental and Occidental Jews, and alſo of the Keri and Chetib ; but we are ſtill farther indebted to Dr. Kennicott for his admirable Hebrew bible and the Diſſertatio Generalis annexed to it. See Bible.

The Arabs have done the ſame thing by their Koran, that the Maſorites have done by the bible : nor do the Jews deny their having borrowed this expedient from the Arabs, who firſt put it in practice in the ſeventh century.

There is a *great* and a *little* maſora, printed at Venice, and at Baſil, with the Hebrew text, in a different character. Buxtorf has written a maſoretic commentary, which he calls Tiberias. See on this ſubject, Dr. Brett's Diſſertation on the ancient Verſions of the Bible, &c. Lond. 1760, or Biſhop Watſon's Collection of Theological Tracts, vol. iii. Kennicott, ubi ſupra, and Diſſertations ; and Jennings's Jewiſh Ant. vol. i. p. 400, &c. and the various authors there cited.

MASORITES, Jewiſh doctors, authors of the maſora.

MASOVIA, or Masunen, in *Geography*, a late palatinate of Poland, being one of the moſt ancient and one of the laſt that remained annexed to the crown. Maſovia properly conſiſted of two palatinates, *viz.* Czerſk or Maſovia Proper, and Polotſk. This palatinate was ſeized by Pruſſia in the general diviſion ; but at the peace of Tilſit, it was taken

taken from Pruſſia, and given to Saxony, forming a part of the duchy of Warſaw.

MASPA, a town of South America, in the audience of Quito; 40 miles N.W. of Archidona.

MASPALOMA, a town on the S.E. coaſt of Canary iſland; 12 miles S. of Palmas.

MASPHA, or MASPHE, in *Scripture Geography*, a country at the foot of mount Hermon, towards the ſprings of Jordan. Joſhua ſays it was inhabited by the Hivites.

MASPHA, or *Maſcpha*, a town of Judea, which belonged to the tribe of Gad, ſituated in the N. and E. part of the tribe of Gad. This town was taken and deſtroyed by Judas Maccabæus.

MASPHE, or MASPHAT, a town of Judea, in the tribe of Benjamin. In this town were ſometimes held the general aſſemblies of the Iſraelites. It was rebuilt by Aſa king of Judah. Here Judas Maccabæus and his brethren aſſembled, in order to fight with Lyſias, general of the army of Antiochus.

MASQUE, or MASK, a cover for the face, contrived with apertures for the eyes and mouth; originally worn chiefly by women of condition, either to preſerve their complexion from the weather, or out of modeſty to prevent their being known.

Poppæa, wife of Nero, is ſaid to be the firſt inventor of the maſque, which ſhe continued to guard her complexion from the ſun and weather, as being the moſt delicate woman, with regard to her perſon, that has been known. Theatrical maſques were in common uſe, both among the Greeks and Romans; Suidas and Athenæus aſcribe the invention of them to the poet Choerilus, a contemporary of Theſpis; Horace attributes them to Æſchylus; but Ariſtotle informs us, that the real inventor, and, conſequently, the time of their firſt introduction and uſe, were unknown. Brantome obſerves, that the common uſe of modern maſques was not introduced till towards the end of the ſixteenth century.

MASQUE is alſo uſed to ſignify any thing uſed to cover the face, and prevent a perſon's being known.

The penitents of Lyons and Avignon hide their faces with large white veils, which ſerve them for maſques.

MASQUE, or *Maſk*, a theatrical drama, much in favour in the courts of princes during the ſixteenth and ſeventeenth centuries, in the latter, particularly in England.

According to Hall's Chronicle, the firſt maſque performed in England was at Greenwich, 1512, "after the manner of Italy;" and Hollingſhed ſays, that "there was not only a maſque, but a good comedy of Plautus performed in 1520." In 1530, a maſque was performed at Whitehall, "conſiſting of muſic, dancing, and a banquet, with a diſplay of groteſque perſonages and fantaſtic dreſſes." This piece ſeems only to have wanted *machinery* to fulfil the idea of a complete maſque, ſuch as were afterwards written by Ben Jonſon and others, which, with a conſtant muſical declamation in *recitative* mixed with *air*, would have formed an opera exactly ſimilar to the muſical drama of Italy, in the enſuing century.

Shakſpeare and Beaumont and Fletcher, have frequently introduced maſques into their plays. Of the fourteen comedies of Shakſpeare, there are but two or three in which he has not introduced ſinging; even in moſt of his tragedies, this wonderful and exquiſite dramatiſt has manifeſted the ſame predilection for muſic.

The French and German writers on our muſical dramas, confound *maſque* with *maſquerade*, and *maſcherata* and *interlude* with the Italian *intermezzo;* but we had interludes long before the Italians had intermezzi, and our poems, or dramas, called maſques, bear no reſemblance to an Italian maſcherata. M. de Miſſy, who in the Bibl. Brit. 1740, has given a regular ſeries of our maſques, more eſpecially thoſe of the ſeventeenth century, is conſtantly miſtaken in theſe particulars.

Maſques were certainly the precurſors of operas in England, and belong to the chain of dramas which completed the union of poetry and muſic on our ſtage: and it does not appear, on examination, that the Italian *Maſcherate*, publiſhed by Laſca, which have been thought their prototypes, were dialogued or performed on any ſtage. They ſeem to have been only proceſſional ſongs, ſung through the ſtreet by the repreſentatives of different profeſſions and trades, *maſqued*, during carnival time. And the interludes which de Miſſy and Riccoboni, and their tranſlators, think we had from the Italian *intermezzi*, ſeem to want analogy: as *interlude*, with us, was a general name for every ſpecies of ſtage repreſentation, out of the church.

Maſques in England certainly bear ſome reſemblance to operas: as they are in dialogue; performed on a ſtage; ornamented with machinery, dances, and decorations; and have always muſic, vocal and inſtrumental. But then the eſſential and characteriſtic criterion, recitative, is wanting, without which the reſemblance is imperfect. Our muſical pieces, which are ſometimes honoured with the name of opera, differ in this particular ſo much, that they more reſemble maſques than the dramas which are entitled to that appellation; for, in Engliſh muſical dramas, the dialogue is all declaimed or ſpoken in the ſame manner as in our old maſques; and in Italy, whence we have both name and thing, an opera conſiſts of both recitatives and airs, and is ſung from the beginning to the end.

Riccoboni ſays, that James I., on coming to the crown in 1603, granted a licence to a company of players, in which patent interludes are included; but an interlude then was another word for a play, whether comedy, tragedy, or farce. Maſques are not mentioned in this patent; but as maſques, at this time, were court entertainments, or performed in the houſes of the nobility, on particular occaſions of feſtivity, the neceſſary machinery and decorations rendered ſuch exhibitions too expenſive for the ordinary public theatres. Indeed, the ſeveral parts in the maſques of the ſixteenth and ſeventeenth centuries were uſually repreſented by the firſt perſonages in the kingdom; if at court, the king, queen, and princes of the blood often performed in them.

Maſques appear to have been ſtill more the favourite amuſements of the court during the early and tranquil part of Charles I.'s reign than in that of James; and the queen, who ſeems to have brought with her from France at leaſt as great a love for dramatic exhibitions as ſhe found here, frequently repreſented the principal character in the piece herſelf. Moſt of the court maſques were written by Ben Jonſon, who, in his ſtation of poet-laureat, ſeems to have furniſhed more of theſe dramas, than birthday or new-years odes. And though the maſques of this reign are frequently ſaid, in the title-page, and dramatis perſonæ, to have been performed by the king, queen, and nobles of their court, yet it does not appear that theſe great perſonages often took part in the dialogue or ſongs of the piece; but generally appeared on the ſtage in the ſplendid ballets only, as dancers, repreſenting mythological or allegorical characters. Indeed, the queen, at the time of the firſt maſques of this reign, can hardly be ſuppoſed ſufficiently exerciſed in our language to undertake a part in which declamation was neceſſary.

In 1633, there were no leſs than five maſques performed at different places before the king and queen, and perſonages fonages of the court. A very circumftantial account of one of thefe has been left in a MS. by lord commiffioner Whitelock, written by himfelf. It was acted at Whitehall, and the whole expence defrayed by the gentlemen of the four inns of court. The whole narrative of this mafque is curious, and may be feen in Burney's General Hiftory of Mufic, vol. iii.

Masque, in *Architecture*, is applied to certain pieces of fculpture, reprefenting fome hideous forms, grotefque, or fatyr's faces, &c. ufed to fill up and adorn vacant places, as in friezes, the pannels of doors, keys of arches, &c but particularly in grottoes.

Masques *and Chilques*. See Chilques.

MASQUELONGE, or Kennoncheque, in *Geography*, a river of America, which runs into lake Michigan, N. lat. 43° 10′. W. long. 87 4′.

MASQUE-POCONA, a jurifdiction of Peru, in the audience of Chareas, extending about 30 leagues. The temperature is hot, but not in a degree too great for vineyards. The valley in which the city ftands is above eight leagues in circumference, and produces all kinds of grain and fruit; and the woods and uncultivated mountains afford great quantities of honey and wax, which conftitute a principal branch of its commerce. The city of the fame name, which is the ufual refidence of the bifhop, is 80 leagues from Santa Cruz de la Sierra; it is very thinly inhabited, though in other parts of the jurifdiction there are feveral populous towns. Juan and Ulloa's Voyages to S. America, vol. ii.

MASQUERADE, or Mascarade, an affembly of perfons mafqued or difguifed, meeting to dance or divert themfelves. This was much in ufe with us, and has been long a very common practice abroad, efpecially in carnival times.

The word comes from the Italian *mafcarata*, and that from the Arabic *mafcara*, which fignifies *raillery*, *buffoonery*. Granacci, who died in 1543, is faid to have been the firft inventor of mafquerades. Encyclopédie.

MASQUINONGE, in *Geography*, a lake of Canada; nine miles N.W. of Montreal. N. lat 47° 10′. W. long. 74° 10′.—Alfo, a river which runs into this lake.

MASRAKITHA, a pneumatic inftrument of mufic among the ancient Hebrews, compofed of pipes of various fizes, fitted into a kind of wooden cheft, open at the top, and ftopped at the bottom with wood covered with a fkin. Wind was conveyed to it from the lips, by means of a pipe fixed to the cheft; the pipes were of lengths mufically proportioned to each other, and the melody was varied at pleafure, by ftopping and unftopping with the fingers the apertures at the upper extremity.

MASRI, in *Geography*, a town of Perfia, in the province of Kerman; 160 miles E.N.E. of Sirgian.

MASS, Massa, in *Mechanics*, the matter of any body cohering with it; *i. e.* moving and gravitating along with it. In this fenfe, mafs is diftinguifhed from bulk or volume, which is the expanfion of a body in length, breadth, and thicknefs.

The mafs of any body is rightly eftimated by its weight. And the maffes of two bodies of the fame weight are in a reciprocal ratio of their bulks.

Mass, or *Meffe*, *Miffa*, in a *religious fenfe*, denotes the office, or public prayers made in the Romifh church, at the celebration of the euchariſt.

Nicod, after Baronius, obferves, that the word comes from the Hebrew, *miffach*, *oblatum*; or from the Latin, *miffa*, *profiorum*; becaufe, in former times, the catechumens and excommunicated were fent out of the church, when the deacon faid, *Ite, miffa eft*, after fermon, and the reading of the epiftle and gofpel; they not being allowed to affift at the confecration. Menage derives the word from *miffio*, *difmiffing*: others from *miffa*, *miffion*, *fending*: becaufe, in the mafs, the prayers of men on earth are fent up to heaven.

Romifh divines define the mafs, an oblation made to God, wherein, by the change of a fenfible object by virtue of a divine inftitution, the fovereign dominion of God over all things is acknowledged.

This they efteem the greateft and moft auguft ceremony in ufe in the church; as being the facrifice of the new law, wherein the body and blood of Jefus Chrift are offered up to God.

They are divided about the queftion, whether or no it be proper or allowable for the fame perfon to celebrate mafs feveral times in one day? Having the authority of pope Leo, in his letter to Diofcorus, for the affirmative fide of the queftion, and that of feveral of the councils for the negative.

There is a great variety of maffes in the Romifh church; the thing acquiring new titles and appellations, according to the different rites, intentions, and manners, in which it is performed, as well as other circumftances. Thus they have a

Mass, *Ambrofian*. celebrated according to the rite of St. Ambrofe; particularly ufed in Milan. See Ambrosian.

Mass, *Englifh*, was the form which anciently obtained in England.

Mass, *Gallican*, is the rite that formerly obtained in the churches of France.

Mass, *Greek*, is that rehearfed according to the Greek rites, in the Greek language, and by Greek priefts.

Mass, *Latin*, is that ufed in the Latin church, in the Latin tongue, and according to the rites of the Latin church.

Mass, *Mozarabic* or *Gothic*, is that which was formerly celebrated in Spain, the rites of which are ftill practifed in the churches of Toledo and Salamanca.

Mass, *High*, called alfo *grand* mafs, is that fung by the chorifters, and celebrated with the affiftance of a deacon and fubdeacon.

Mass, *Low*, is that wherein the prayers are all barely rehearfed, without any finging, and performed without much ceremony, or the affiftance of any deacon or fubdeacon.

Mass *of the Beata*, or *our Lady*, is that offered to God, by the means and through the interceffion of the Virgin.

Mass, *Beau*, is a mafs rehearfed every day, at which the ladies and beau-monde of the place attend. This is alfo called the *perfumed* mafs.

Mass, *Common*, or *mafs of the community*, in a monaftery, is that celebrated at certain hours, at which the whole body affifts.

Masses, *Solitary*, or *Private*, were thofe that were celebrated by the prieft alone, in behalf of the fouls detained in purgatory, as well as upon fome other particular occafions. Thefe maffes were prohibited by the laws of the church in the eighth century, but they were a rich fource of profit to the clergy. They were condemned by the canons of a fynod, affembled at Mentz, under Charlemagne, as criminal innovations, and as the fruits of avarice and floth.

Mass *of the Holy Ghoft*, is that celebrated at the beginning of any folemnity or church affembly, commencing with an invocation of the Holy Ghoft.

Mass,

Mass, *Holiday*, is that wherein certain prayers, or leſſons, are read, ſuitable to the day.

Mass *of judgment*, was that wherein a perſon cleared himſelf of any calumny, by ſome proof agreed upon.

Mass *for the death of our enemies*, was a form that obtained a long time in Spain; but it was at length aboliſhed, as inconſiſtent with Chriſtian charity.

Mass *of the dead*, or *requiem*, is that performed at the requeſt of the deceaſed: the introit whereof begins with Requiem. In the thirteenth century it was the cuſtom, before criminals were carried out to execution, to make them attend at a maſs of the dead, rehearſed for the repoſe of their ſouls.

Mass, *Pariſh*, or *great* maſs, is that which the parſon is obliged to rehearſe to his pariſhioners on Sundays and holidays.

Mass, *Little*, is that ſaid at private altars, with leſs ceremony. The firſt maſs is that ſaid at break of day.

Mass *of a ſaint*, is that wherein God is invoked by the interceſſion of ſome ſaint.

Thus there are alſo maſſes of apoſtles, martyrs, pontiffs, virgins, &c.

Mass *of ſcrutiny*, was formerly rehearſed at the examination of catechumens, when inquiry was made as to their diſpoſition for baptiſm.

Mass, *Silent*. See Messa *Baſſa*.

Mass, *Dry*, is that where there is no conſecration; as that, according to Durandus, where the prieſt cannot conſecrate, by reaſon of his having ſaid maſs before on the ſame day: or it is that uſed by the candidates of the prieſthood, in order to their becoming acquainted with the ceremonies; as Eckius will have it.

Mass, *Votive*, is an extraordinary maſs, beſides that of the day, rehearſed on ſome extraordinary occaſion.

Mass *of the preſanctified*, is that in which there is no conſecration of the elements; but after ſinging ſome hymns, the bread and wine which were before conſecrated are received. This maſs is performed among the Greeks, who conſecrate the euchariſt in Lent only on Saturdays and Sundays. Among the Latins, it is uſed only on Good Friday.

Mass-*books, importing or ſelling of*, and other popiſh books, incurs a penalty of 40*s*. by 3 Jac. I. cap. 5. ſec. 25.

Mass, *Candle*. See Candle-*maſs*.

Mass, *Childer*. See Childer-*maſs*.

Mass, *Chriſt*. See Christ-*maſs*.

Mass *of pope Julius* is a very celebrated picture of Raphael repreſenting the ceremony of the maſs in the Vatican, and diſtinguiſhed by its rich and excellent colouring.

Mass, in *Painting*, a technical term of the art, which implies an union of a variety of parts, ſo as to convey to the eye one undivided impreſſion. It likewiſe ſignifies, in its ordinary ſenſe, a large portion of one colour.

MASSA, in *Anatomy*, a name applied to one of the muſcles of the foot, the flexor acceſſorius digitorum pedis; which is called maſſa carnea Sylvii. See Flexor.

Massa, *Duchy of*, in *Geography*, a ſmall principality, ſituated near the Mediterranean, between Genoa and Tuſcany. This principality, and that of Carrara, were, before the French revolution, annexed to Modena, and were transferred with it to the Ciſalpine republic. On a ſubſequent change in 1806, they were given to Lucca.

Massa, a town of the republic of Lucca, and lately the capital of a duchy of the ſame name; ſituated on the river Frigida, near the ſea: the ſee of a biſhop, ſuffragan of Piſa; 53 miles S.S.W. of Modena. N. lat. 44° 2'. E. long. 10° 1'.—Alſo, a town of Etruria, in the ſtate of Sienna, the ſee of a biſhop, ſuffragan of Populonia. Borax and lapis lazuli are found in its vicinity; 24 miles S.W. of Sienna. N. lat. 43° 5'. E. long. 10° 53'.

Massa *di Sorento*, a ſea-port town of Naples, in the province of Lavora, having a harbour for ſmall veſſels. On the ſea-ſhore is an ancient temple adorned with marble columns, and a Moſaic pavement. It is now dedicated to St. Peter. It has a high watch-tower, like thoſe along the coaſt. A little farther is the cape or promontory of Minerva, deriving its name from a temple in honour of that goddeſs, on an eminence facing Sorento. Seneca calls this temple "Athenæum," as it had been built or conſecrated to Pallas, goddeſs of Athens. On the ſcite of its ruins is a watch-tower: from which medals and vaſes have been occaſionally dug. This cape was fatal to moſt of the ſhips of L. Junius's fleet, who, ſailing to join thoſe of P. Claudius Pulcher, his colleague, which had been defeated by Aſdrubal, admiral of the Carthaginians, was driven by a ſtorm againſt this promontory; and the loſſes ſuſtained by the two conſuls were ſo great, that the Carthaginians, in conſequence of them, became maſters of the ſea for five or ſix years; or, till the battle won by C. Lutatius over them, which terminated the firſt Punic war; ſix miles S.W. of Sorento.

Massa, a town of Italy, in the department of the Lower Po; 24 miles S.S.E. of Ferrara.

Massa, a town of Fez; eight miles S. of Salee.

MASSAC Creek, a river of America, in Kentucky, which runs into the Ohio, N. lat. 36° 47'. W. lat. 89° 25'.

Massac *Fort*, a fort built by the French on the W. bank of the Ohio, near its mouth in N. lat. 37° 15', 11 miles below the mouth of Teneſſee river. A conſiderable quantity of land above and below the fort is annually inundated.

MASSACCIO, a town of Italy, in the marquiſate of Ancona; 18 miles S.W. of Ancona.

MASSACHUSETTS Proper, conſtituting with the diſtrict of *Maine* (which ſee), one of the United States of America, is ſituated between 41° 13' and 43° 52' N. lat. and between 69° 50' and 73' 10' W. long. Its greateſt length is 190 miles, and its greateſt breadth 90 miles: in its whole extent it contains 6250 ſquare miles. On the N. it is bounded by Vermont and New Hampſhire; E. by the Atlantic ocean; S. by the Atlantic, Rhode iſland, and Connecticut; and W. by New York. This part of Maſſachuſetts is divided into twelve counties, which, with the number of houſes, inhabitants, and chief towns in each, are exhibited in the following table.

Counties.	No. Towns in 1790.	No. Towns in 1800.	No. Houſes in 1790.	No. Houſes in 1800.	No. Inhab. in 1790.	No. Inhab. in 1800.	Chief Towns.	No. Inhab. in 1790.	No. Inhab. in 1800.
Suffolk }	23	4	6,355	3,286	44,875	28,015	Boston -	18,038	24,937
Norfolk }		22		3,429		27,216	Dedham -	1,659	1,973
Eſſex	22	23	7,644	7,995	57,913	61,196	{ Salem -	7,921	9,457
							{ Newburyport	4,837	5,946
Middleſex	41	42	5,998	6,585	42,737	46,928	{ Charleſtown -	1,583	2,751
							{ Concord -	1,590	1,679
Hampſhire	60	62	9,181	9,346	59,681	72,432	{ Northampton -	1,628	2,190
							{ Springfield -	1,574	2,312
Plymouth	15	15	4,240	4,387	29,535	30,073	Plymouth -	2,995	3,524
Briſtol	15	15	4,514	4,695	31,709	33,880	Taunton -	3,804	3,860
Barnſtable	10	13	2,343	2,537	17,354	19,293	Barnſtable -	2,610	2,964
Duke's	3 }	3	1,013	463	3,205	3,118	Edgarton -	1,352	1,226
Nantucket	1 }	1		779	4,620	5,617	Sherburne -	4,620	5,617
Worceſter	49	49	8,613	9,239	56,807	61,192	Worceſter -	2,095	2,411
Berkſhire	26	30	4,476	4,764	30,291	33,670	{ Stockbridge -	1,336	1,261
							{ Great Barrington	1,373	1,754
Total	265	279	54,377	57,505	378,727	422,630			

The capital of this ſtate is *Boſton*, which ſee: its population is about ſixty perſons for every ſquare mile, and this is the only ſtate in the union in which there are no ſlaves. The weſtern part of this ſtate is ſomewhat mountainous and hilly, and its climate reſembles that of *New England*, to which we refer. By an admeaſurement made by the barometer at Princeton, in this ſtate, about 45 miles N.W. from Boſton, and at Cambridge, in the year 1777, it appears that Princeton is 1332 feet higher than the level of the ſea. The ſummit of Wachuſet mountain in Princeton was found to be 2989 feet above the ſame level, and may be ſeen at the diſtance of 60 miles.

In Maſſachuſetts are to be found all the varieties of ſoil, from very good to very bad, capable of yielding all the different productions common to the climate, ſuch as Indian corn, rye, wheat, barley, oats, hemp, flax, hops, potatoes, field beans and peas, apples, pears, peaches, plums, cherries, grapes, &c. That part of the ſtate which is diſtinguiſhed by the name of the *Old* or *Plymouth Colony*, including the counties of Barnſtable, Duke's, Nantucket, Briſtol, and Plymouth, in point of ſoil, is the pooreſt part of the ſtate, being generally ſandy and light, interſperſed, however, with many excellent tracts of land. The northern, middle, and weſtern parts of the ſtate, have, generally ſpeaking, a ſtrong good ſoil, adapted to grazing and grain; very ſimilar to the ſoil of New Hampſhire and Vermont on one ſide, and to that of Rhode iſland and Connecticut on the other. It has been obſerved that the effects of the eaſt winds extend farther inland than formerly, and injure the tender fruits, particularly the peach, and even the more hardy apple. The average produce of the good lands, well cultivated, has been eſtimated as follows: 30 buſhels of corn on an acre, 30 of barley, 20 of wheat, 15 of rye, 200 of potatoes. The beſt cultivated and moſt productive part of the ſtate lies in the vicinity of Boſton. Cambridge, Newton, Roxbury, Dorcheſter, and Dedham, are ſaid to be literally gardens, from which the inhabitants of the capital are principally ſupplied with the fineſt fruits, roots, and vegetables. The ſtaple commodities of this ſtate are fiſh, beef, lumber, &c. The chief towns of this ſtate, beſides Boſton the metropolis, are Salem, Newburyport, Charleſtown, Worceſter, Northampton, Springfield, Plymouth, Ipſwich, &c. The country is well watered by a number of ſmall rivers, ſome of which fall into Connecticut river, which paſſes ſoutherly through the W. part of the ſtate; others run northward to Merrimack river, which enters from New Hampſhire, and waters the N.E. corner of the ſtate: others paſs into Connecticut and Rhode iſland; Myſtick and Charles rivers fall into Boſton bay; and others fall into the Atlantic ocean in different parts of the ſea-coaſt. The only capes of conſiderable note on the coaſt of this ſtate, are cape Ann, on the N. ſide of Maſſachuſetts bay, and cape Cod on the ſouth. Beſides theſe, there are cape Malabar, or Sandy point, extending ten miles S. from Chatham towards Nantucket, cape Poge, the N. point of Chabaquiddick, and Gay Head, the weſt point of Martha's Vineyard. The chief bays on the coaſt are Ipſwich, Boſton, Plymouth, cape Cod or Barnſtable, and Buzzard's. The iſlands ſcattered along the coaſt are numerous; the principal of which are Plum iſland, Nantucket, Martha's Vineyard, Elizabeth iſland, and Edgarton, which includes the fertile iſland of Chabaquiddick; beſides which there are many ſmall iſles in Boſton bay. Within the ſtate are ſeveral light-houſes. Locks and canals in various parts of the ſtate have been objects of contemplation; ſuch as one between Barnſtaple bay and Buzzard's bay, another between Boſton and ſome part of Connecticut river; and ſome others, all of which remain to be completed. The locks and canals in Connecticut river were projected for the purpoſe of rendering this river paſſable for boats and rafts from the mouth of Chickapee river, northward, throughout the commonwealth. By a ſubſequent law, two ſeparate corporations have been formed; the one called the Upper Canals for improving the navigation of the river between the mouth of Deerfield river, and the head of the Miller's falls; the other, called the Lower Canals, for improving the navigation of the river between the head of the falls at South Hadley and the mouth of Chickapee river.

Iron ore, in immenſe quantities, has been found in various parts of this ſtate, particularly in the old colony of Plymouth, which has become the ſeat of the iron manufactures. In the towns of Taunton, Bridgewater, Middleborough, &c. nails have been made in ſuch quantities as to prevent, in a great meaſure, the importation of them from Great Britain. The

The manufacture of nails has engaged particular attention, and machines have been conſtructed for facilitating and expediting it. Copper ore, black lead, white pipe-clay, yellow and red ochre, alum ſtone, ruddle or red earth, limeſtone, marble, aſbeſtos, and pyrites, are ſupplied in different parts of this ſtate. Several mineral ſprings have alſo been diſcovered. Manufactories of cotton and woollen have been attempted, with various ſucceſs, at Beverley, Worceſter, Boſton, and Newbury. There are in this ſtate upwards of twenty paper-mills, which make more than 70,000 reams of writing, printing, and wrapping-paper annually. At Boſton, Cambridge, Lynn, Ipſwich, Dedham, &c. are other manufactories for cotton and wool cards, playing cards, ſhoes, lace, wire, &c There are alſo ſeveral ſnuff, oil, chocolate, and powder-mills in different parts of the ſtate, and a variety of mills for ſawing lumber, grinding grain, and fulling cloth. In 1792 there were 62 diſtilleries in this ſtate, employed in diſtilling from foreign materials. The number of gallons diſtilled in one year has been 1,900,000, which at a duty of 11 cents a gallon, yields a revenue to the government of 209,000 dollars.

This ſtate is alſo famous for its literary, humane, and other ſocieties; ſuch are the American Academy of Arts and Sciences, incorporated May 4, 1780; the Maſſachuſetts Charitable Society, incorporated December 16, 1779; the Boſton Epiſcopal Charity Society, incorporated Feb. 12, 1784; the Maſſachuſetts Medical Society, incorporated Nov. 1, 1781; the Humane Society, incorporated in 1791; the Society for propagating the Goſpel among the Indians and others in North America, incorporated Nov. 19, 1787; the Maſſachuſetts Miſſionary Society, inſtituted in 1799; the Hampſhire Miſſionary Society, inſtituted about the year 1800; the Berkſhire and Columbia Miſſionary Society; the Maſſachuſetts Baptiſt Miſſionary Society, inſtituted in 1802; and the Maſſachuſetts Society for promoting Chriſtian Knowledge, founded in 1804. To theſe we may add, the Maſſachuſetts Society for promoting Agriculture, incorporated in 1792; the Hiſtorical Society, eſtabliſhed in 1791; a Marine Society; the Maſſachuſetts Congregational Society, incorporated for the relief of widows and children of deceaſed clergymen; the Middleſex Medical Society, founded in 1790; a Society for the Aid of Emigrants, inſtituted in 1793; the Maſſachuſetts Charitable Fire Society, inſtituted in 1794; the Boſton Mechanic Aſſociation, eſtabliſhed in 1795, &c. &c. Schools and academies are very numerous. See alſo College.

The commerce of Maſſachuſetts is extenſive and lucrative. Her ſhips viſit almoſt all parts of the world. Her principal exports, of her own productions, conſiſt of pot and pearl-aſhes, flax-ſeed, whale-oil, ſpermaceti, whale-bone, ſpermaceti candles, fiſh dried and pickled, beef, pork, cheeſe, butter, and various other kinds of proviſions, live ſtock, American rum, cotton and wool cards, men's and women's ſhoes, ſnuff and manufactured tobacco, houſehold furniture, various kinds of lumber, as boards, planks, oars and rafters, oak and pine timber, ſhingles, ſtaves and heading, ſhip-timber, &c Of theſe articles, and others, the produce or manufacture of the ſtates, together with articles of foreign growth, imported for exportation to other countries, were exported in the year ending September 30, 1791, to the amount of 2,445 975 dollars, 53 cents. Beſides ſhoes, cards, hats, ſaddlery, and various other manufactures, and ſeveral articles the produce of the country to a great amount, exported to the ſouthern and other ſtates, not included in this amount.

In the year ending September 30, 1793, the exports from this ſtate (with the ſame exceptions and qualifications as above) amounted to 3,676,412 dollars; in 1799, to 11,421,591 dollars; and in 1804 to 16,894.379.

This ſtate owns more than three times as many tons of ſhipping as any other of the ſtates, and more than one-third part of the whole that belongs to the United States. Upwards of 29,000 tons are employed in carrying on the fiſheries; 46,000 in the coaſting buſineſs, and 96,564 in trading with almoſt all parts of the world.

Pot and pearl-aſh, ſtaves, flax-ſeed, bees-wax, &c. are carried chiefly to Great Britain, in remittance for their manufactures; maſts and proviſions to the Eaſt Indies; fiſh, oil, beef, pork, lumber, candles, &c. are carried to the Weſt Indies, for their produce, and the two firſt articles, fiſh and oil, to France, Spain, and Portugal; roots, vegetables, fruits, and ſmall meats, to Nova Scotia and New Brunſwick; hats, ſaddlery, cabinet work, men's and women's ſhoes, nails, tow-cloth, barley, hops, butter, cheeſe, &c. to the ſouthern ſtates. The Negro trade was prohibited by law in 1788, and there is not a ſingle ſlave belonging to the commonwealth.

The principal ſources of revenue are land and poll taxes, and the ſales of new lands. Taxes are levied on all males upwards of ſixteen, except ſuch as are exempted by law; alſo on the number of acres of improved and unimproved land, on dwelling-houſes and barns, ware-houſes, ſtores, &c. Theſe are all valued, and upon this valuation taxes are laid, at the rate of ſo many pounds for every 1000*l.*

In January 1805, the funds and expenditures of the commonwealth, as received from the treaſurer, were as follows, *viz.*

		Dols. Cts.
Amount of public debt, funded and unfunded, neareſt - -		1,000,000 00

Funds of the commonwealth, as eſtimated January, 1805.

In United States Stocks, 6 per cents. 3 per cents. 6 per cents. deferred, at par value, dols. 761,225 $\frac{79}{100}$. Value at market prices, January 1805, as reported to the legiſlature - -	618,421 34	
Amount of bonds and notes due, for ſale of lands, (good for not more than)	100,000	
$\frac{1}{3}$ capital ſtock of the Union Bank - -	400,000	
$\frac{1}{3}$ ditto of the Boſton Bank	600,000	
Dividends 7 to 8 per cent. per annum - -	———	1,718,421 34

Annual expence for the ſupport of government, eſtimated January, 1805, neareſt 175,000 dols.

The conſtitution of the commonwealth of Maſſachuſetts eſtabliſhed in 1780, contains a declaration of rights and a frame of government. The declaration aſſerts the natural freedom and equality of men—Liberty of conſcience—Freedom of the preſs—Trial by jury—Sovereignty and independence—that all power is in the people—that hereditary honours and emoluments are inadmiſſible—that every ſubject is entitled to protection of life, liberty and property—and, in return, muſt obey the laws and pay his proportion of the common expence—that he ſhall not be obliged to accuſe himſelf; but may be heard in his own defence—that he may keep arms; but ſtanding armies ſhall not be maintained in time of peace—that no tax ſhall be levied without the conſent confent of the people by their reprefentatives—that no *ex poft facto* law fhall be made—that the martial law fhall extend only to men in actual military fervice—that the legiflative, executive, and judiciary powers fhall be kept diftinct, &c. By the frame of government, the power of legiflation is lodged in a general court, confifting of two branches, *viz.* a fenate and a houfe of reprefentatives, each having a negative upon the other. They meet annually on the laft Wednefday in May. No act can be paffed without the approbation of the governor, unlefs two-thirds of both branches are in favour of it after a revifal. Either branch, or the governor and council, may require the opinion of the juftices of the fupreme judicial court, upon important queftions. Senators are chofen by diftricts, of which there cannot be lefs than thirteen. The number of counfellors and fenators for the whole commonwealth is forty; the number in each diftrict is in proportion to their public taxes; but no diftrict fhall be fo large, as to have more than fix. Sixteen fenators make a quorum. The reprefentatives are chofen by the feveral towns, according to their numbers of rateable polls. For 150 polls one is elected; and for every addition of 225, an additional one. Their travelling expences, to and from the general court, are defrayed by the public, but their wages for attendance are paid by their own towns. Impeachments, for mifconduct in office, are made by the reprefentatives, and tried by the fenate; but the judgment can go only to removal from office and future difqualification. Money bills originate in the houfe of reprefentatives, but may be altered by the fenate. Reprefentatives are privileged from arrefts on mefne procefs. Sixty members make a quorum. The fupreme executive authority is vefted in a governor, who is elected annually by the people, and has a council confifting of the lieutenant-governor, and nine gentlemen chofen out of the forty, who are returned for counfellors and fenators. Five counfellors make a quorum. The governor is commander of all the military force of the commonwealth. He may convene the general court, may adjourn them, when the two branches may difagree about the time, and in their recefs, may prorogue them from time to time, not exceeding ninety days—may pardon convicts, but the legiflature alone can grant pardons before conviction. He commiffions all officers, and with the advice of the council, appoints all judicial officers. Military officers are thus appointed; the refpective companies choofe their captain and fubalterns, who choofe their regimental officers, who choofe their brigadiers. The major-generals are appointed by the general court. Juftices of the peace are commiffioned for feven years; all other judicial, and all executive and military officers continue during good behaviour, yet are removable by the governor upon addrefs of the legiflature. The falaries of the governor and juftices of the fupreme court cannot be diminifhed, although they may be enlarged. Official qualifications are as follows: for a voter, twenty-one years of age, one year's refidence, a freehold of three pounds annual value, or fixty pounds of any other eftate—for a reprefentative, 100*l.* freehold, or 200*l.* other eftate, and one year's refidence in the town—for a fenator, 300*l.* freehold, or 600*l.* other eftate in the commonwealth, and five years refidence in the diftrict—for governor, or lieutenant-governor, 1000*l.* freehold, and feven years refidence. Every governor, lieutenant-governor, counfellor, fenator, or reprefentative, muft declare that he believes the Chriftian religion, and has the legal qualifications. A governor, lieutenant-governor, or juftice of the fupreme court, can hold no other office. No man fhall hold two of thefe offices, judge of probates, fheriff, regifter. No juftices of the fupreme court, fecretary, attorney-general, treafurer, judge of probate, inftructor of Harvard college, clerk, regifter, fheriff or cuftom officer, can have a feat in the legiflature. The privilege of Habeas Corpus cannot be fufpended more than a year at one time. In 1795, if two-thirds of the qualified voters defire it, a convention fhall be called to revife the conftitution. This period is now paft; a vote for a revifion could not be obtained; a convincing proof that the people feel themfelves happy under their prefent government.

The militia of Maffachufetts is compofed of all the able-bodied white male citizens from 18 to 45 years of age, excepting from the enrolment, within thofe ages, clergy, fchool-mafters, civil officers of importance, either under the ftate or federal government, and alfo thofe who have held any military commiffion whatever. The whole is formed into ten divifions, which, in January 1805, comprehended 58,879 infantry, 2679 cavalry, and 2581 artillery. Thefe divifions are fubdivided into 22 brigades, 90 regiments of infantry, 59 troops compofing 18 fquadrons or battalions of cavalry; and 54 companies of artillery: the latter are furnifhed each with two light brafs pieces attached to the brigades, with tumbrils and apparatus complete; and have charge of various other heavy field-pieces, ftationed all along the fea-coaft. There is an annual return made of the whole militia to the adjutant-general, who makes out duplicate abftracts for the governor, and for the prefident of the United States.

The religion of this ftate is eftablifhed by their conftitution on a liberal and tolerant plan. All perfons, of whatever religious profeffion or fentiments, may worfhip God agreeably to the dictates of their own confciences, unmolefted, provided they do not difturb the peace. The great body of the people are Congregationalifts, profeffing Calviniftic doctrines; but fome are avowedly Arminians, and fome Unitarians; and, as Morfe fays, the latter it is fuppofed are increafing. Morfe's Geog. vol. i.

MASSACHUSETTS *Fort*, a fort of America, on the borders of Vermont and New York; nine miles S. of Bennington.

MASSACHUSETTS *Sound*, on the N.W. coaft of America, is fituated on the fouthern fide of the Quadras ifle.

MASSACIACOLI, a town of the republic of Lucca; nine miles S.W. of Lucca.

MASSACRE ISLAND. See MAOUNA.

MASSACRE *River*, a river of Hifpaniola, which runs into the fea on the N. fide of the ifland, N. lat. 19° 45'. W. long. 72° 32'.

MASSADA, in *Ancient Geography*, a fortrefs of Paleftine, in the tribe of Judah, fituated on the mountain Achila, N. of the town of Ziph, was built by one of the Maccabees. At the time of the reduction of Judea, A. D. 73, Flavius Silva, governor of Judea, made an expedition againft this fortrefs. It was in the poffeffion of Eleazar, a commander of the Sicarii. He was a defcendant of Judas, who had perfuaded many of the Jews not to fubmit to the affeffment made by Cyrenius, when he came into Judea, after the removal of Archelaus. When there was no method of efcaping, Eleazar called together the principal perfons, and confulted with them what might be beft to be done; at which time he addreffed them with an oration, in order to induce them to kill themfelves rather than to fall into the hands of the Romans. This oration had great effect on many; fome ſome, however, heſitated ; but in the progreſs of his addreſs, all were perſuaded. They then choſe ten men of the number, by lot, to ſlay all the reſt. When theſe ten men had executed their commiſſion, and ſlain men, women, and children, they caſt lots upon themſelves, and he who had the firſt lot killed the other nine, and then himſelf. There remained, however, one ancient woman, and another woman related to Eleazar, who exceeded moſt women in knowledge and prudence, and five children, who had hid themſelves in a cavern under ground : they had carried water with them for their drink, and lay quiet there, while the reſt were intent upon the ſlaughtering of each other. The whole number of theſe people, the women and children juſt mentioned, was 960. This ſlaughter was made on the 15th day of April, A. D. 73. Joſephus.

MASSAFRA, in *Geography*, a town of Naples, in the province of Otranto ; 9 miles N.W. of Otranto.

MASSAGANO, a town of Angola, and capital of a province, to which it gives name, on the Coanza ; 100 miles E.S.E. of Loanda. S. lat. 9° 54′. E. long. 14° 40′.

MASSAGETES, in *Ancient Geography*, a people of Aſia, who inhabited the country on the weſt of the Caſpian ſea, and who imitated the free Scythians in their habit, manner of living, arms, and warlike genius ; but they uſed, beſides bows and arrows, javelins and ſcymetars. Braſs ſerved them inſtead of ſteel for making their offenſive weapons, and their defenſive armour was ornamented with gold. Their horſes were likewiſe fenced with a breaſt-plate of braſs, whilſt their bridles and other furniture were adorned with gold ; for ſilver and iron were not uſed by them, becauſe their country did not produce theſe metals. Although every man was obliged to marry a wife, yet they held them all in common ; ſo that when a man met with a woman to his liking, he took her into his chariot or waggon, and cohabited with her without any further ceremony, than hanging up his quiver at the head of it. This cuſtom, Herodotus tells us, was unjuſtly attributed to all the Scythians by the Greeks, whereas it was peculiar to the Maſſagetes only. A more inhuman cuſtom than this was adopted by them, according to this author, which was, that when a man had once attained to old age, which was not ſo much limited by law as inferred by concurring ſymptoms, all his relations met, and ſacrificed him, together with a number of cattle of ſeveral kinds, and having boiled the fleſh altogether, they ſit down to it as a feaſt. This kind of death was accounted by them the moſt happy, as that of dying by ſickneſs was reckoned unfortunate, becauſe thoſe who died in this way were buried, inſtead of acquiring the honour of being ſacrificed to their gods, and feaſted upon by their neareſt relations, and intimate friends. The ſun was the only deity they worſhipped, and to him they ſacrificed horſes, which, being reckoned the nobleſt and ſwifteſt of all creatures, they thought moſt proper to be offered to the nobleſt and ſwifteſt of all the gods. They neither ſowed nor planted ; but contented themſelves with the milk and fleſh of their cattle, and with fiſh, of which the Iaxartes afforded a very great plenty. Herodotus, lib. i. cap. ult. and lib. iv. cap. 172. Anc. Un. Hiſt. vol. iv.

MASSAGONG, in *Geography*, a ſmall iſland in the Eaſt Indian ſea, near the eaſt coaſt of Naſſau. S lat. 3° 8′. E. long. 100 5′.

MASSALAGEM, *New*, a ſea-port town of Madagaſcar, on the W. coaſt. S lat. 16° 30′. E. long. 63 10′.

MASSALAGEM, *Old*, a ſea-port town of Madagaſcar, on the W. coaſt ; 60 miles N. of New Maſſalagem.

MASSALIANS, MASSALIANI, in *Eccleſiaſtical Hiſtory*, certain ſectaries, ſo called from a Hebrew word, ſignifying *prayer* ; it being their diſtinguiſhing tenet, that a man is to be continually in prayer.

St. Epiphanius diſtinguiſhes two kinds of Maſſalians, the *ancient* and the *later*.

The *ancient*, according to him, were neither Jews, Chriſtians, nor Samaritans, but pure Gentiles ; who, owning ſeveral gods, adored only one, whom they called Almighty.

As to the *later* Maſſalians, who were by profeſſion Chriſtians, their riſe was not till about the time of St. Epiphanius. Their doctrine was, that prayer alone was ſufficient to ſalvation. Many monks, who loved a life of lazineſs, and were averſe from labour, at times, joined theſe Maſſalians. See EUCHITES.

MASSANDRA, in *Geography*, an iſland of Africa, on the river Coanza ; 24 miles from its mouth.

MASSANI, in *Ancient Geography*, a people of India, who, among others, were ſubdued by Alexander, according to Quintus Curtius. They inhabited a territory near the mouth of the river Indus.

MASSANIELLO, or ANELLO THOMAS, in *Biography*, a fiſherman of Naples, a remarkable leader of revolt, which was cauſed on account of ſome unreaſonable impoſitions in the ſhape of taxes. His father was a fiſherman, and he was brought up to the ſame buſineſs, and was at a very early period diſtinguiſhed among his companions by his courage, his activity, and integrity. From his perſon and manners he obtained the eſteem and love of all who knew him. At the time when this obnoxious tax was introduced, *viz.* in the year 1647, Maſſaniello was twenty-four years of age, and had a wife and ſeveral children. His wife had been detected in ſmuggling a ſmall quantity of meal for the ſupport of her infant offspring, and had not only been impriſoned for the offence, but condemned to pay a large fine, for the diſcharge of which they were obliged to ſell their furniture. Exaſperated both on his own, and the public account, Maſſaniello excited his friends to aſſiſt him in driving away the officers : they were ſoon joined by the populace, who demoliſhed all the tax-offices throughout the city, and then demanded the abolition of the tax itſelf. They not only carried their point, but obtained the offer to their leader, Maſſaniello, of a large penſion, which he nobly refuſed. Theſe conceſſions, inſtead of reſtoring order in the city, left it at the mercy of the mob ; and at the inſtigation of ſome of the malecontents, Maſſaniello was induced to iſſue a command for burning the houſes of all perſons concerned in levying the tax, which was very readily executed. He then required the viceroy to aboliſh all taxes of every kind. This, and other conceſſions being allowed, Maſſaniello ſoon found himſelf at the head of a vaſt body of men, and exerciſed uncontrolled ſway. He ſpent little time in refreſhment or repoſe, gave his orders with preciſion and judgment, and appeared free from all perſonal views of intereſt or ambition ; he began, however, to govern with more ſeverity, and put to death ſeveral perſons upon mere ſurmiſes. The viceroy, apprehending leſt the French ſhould take advantage of this confuſion, entered into a treaty with Maſſaniello, granting every thing that had been demanded, and agreeing that he ſhould retain his power, and the people their arms. This ſucceſs was his ruin : intoxicated with power, and diſordered by the conſtant agitation of his mind, he became frantic, and performed all ſorts of extravagant actions, to which an end was put by his aſſaſſination, on the 18th of July, only ten days after his extraordinary elevation. Every indignity was ſhewn to his body ; but in the courſe of a few days, the very rabble who had joined in throwing it into the common ſewer, upon a temporary riſe of proviſions, reclaimed it, it, and carried it through the ſtreets in ſolemn proceſſion, and gave it a magnificent burial. Mod. Univer. Hiſt.

MASSAPA, in *Geography*, a town of Africa, in the country of Mocaranga; 230 miles N.W. of Sofala. S. lat. 18° 10'. E. long. 32° 10'.

MASSARIA, Alexander, in *Biography*, a phyſician of celebrity in the ſixteenth century, was born at Vicenza, and graduated at Padua, where he ſtudied under Fallopio, and the other eminent profeſſors of that ſchool. He then returned to his native place, where he practiſed his profeſſion, with conſiderable reputation, for the ſpace of twenty-five years; when his fame had recommended him to the magiſtracy of Venice, whither he was invited; and he ſettled there in the year 1578. Nine years afterwards, when Hieron. Mercurialis quitted his profeſſorial chair, and removed to Bologna, Maſſaria was immediately appointed his ſucceſſor. He performed the functions of his new office with conſiderable eclat, and attracted a large concourſe of pupils; and at the ſame time was conſulted by the firſt people of the ſtate. He died ſuddenly in the year 1598, when upwards of ſeventy years of age. He was the author of ſeveral works; eſpecially a treatiſe on the plague, on the abuſe of bliſters, on the proper uſe of blood-letting and purging in fevers, (in which he oppoſed the indiſcriminate recommendation of that practice into which Botallus had fallen); and alſo on the diſeaſes of women, and on ſyphilis. The work, which has been moſt frequently reprinted, was his "Practica Medica, ſeu Prælectiones Academicæ," a ſyſtematic treatiſe on the diſeaſes of the whole body; firſt publiſhed at Francfort, in 1601. Eloy Dict. Hiſt. de la Méd.

MASSASYLIANS, in *Ancient Geography*, a people who inhabited the interior of Mauritania Cæſarienſis, on the mountains called Durdus.

MASSAT, in *Geography*, a town of France, in the department of the Arriege, and chief place of a canton, in the diſtrict of St. Girons; nine miles W. of Taraſcon. The place contains 7456, and the canton 12,157 inhabitants, on a territory of 157½ kiliometres, in four communes.

MASSEDAY Bay, a bay on the W. coaſt of Mexico, between Acapulco and Aquacara, a port near the cape of California, where ſir Thomas Cavendiſh lay after he had paſſed the ſtraits of Magellan.

MASSEL, a town of Sileſia, in the principality of Oels; three miles N.E. of Trebnitz, having near it an eminence called Topplesberg, which was once a famous Pagan burying ground.

MASSERANO, a town of France, in the department of the Seſia; lately the capital of a papal fief, inſulated in Piedmont; 43 miles N.N.E. of Turin. N. lat. 45° 39'. E. long. 8° 9'.

MASSETER, in *Anatomy*, a powerful muſcle belonging to the lower jaw: it is deſcribed in the article Deglutition.

MASSEUBE, in *Geography*, a town of France, in the department of the Gers, and chief place of a canton, in the diſtrict of Mirande; nine miles S.E. of Mirande. The place contains 1250, and the canton 11,215 inhabitants, on a territory of 220 kiliometres, in 36 communes. N. lat. 43° 25'. E. long. 0° 39'.

MASSEY's Island, a ſmall iſland in the Pacific ocean, diſcovered in 1790 by lieut. Ball; S.S.W. of Sirius iſland.

Massey's *Town* lies on the northern bank of Ohio river in America, between Little Miami and Scioto rivers.

MASSI, a people of Africa, on the banks of the lake Meravi.

MASSIA, a river of Mexico, which runs into the Pacific ocean. N. lat. 16° 30'.

MASSIAC, a town of France, in the department of the Cantal, and chief place of a canton, in the diſtrict of St. Flour; 14 miles N. of St. Flour. The place contains 2522, and the canton 9870 inhabitants, on a territory of 252½ kiliometres, in 15 communes.

MASSIANAC, a town on the E. coaſt of Madagaſcar. S. lat. 22° 50'. E. long. 47° 55'.

MASSICOT. See Masticot.

MASSIESBURG, in *Geography*, a town of America, in the ſtate of Ohio, and county of Adams, ſituated on the northern bank of the Ohio, 38 miles below the Scioto, or ſix miles above Limeſtone, in Kentucky, ſettled in 1790. About 10 miles above it is a thriving town, built on the N. bank of the Ohio, incorporated in 1802.

MASSIEU, William, in *Biography*, a man of letters, was born at Caen in 1665. When he had finiſhed his ſchool ſtudies, he was entered among the Jeſuits, but in a ſhort time he diſengaged himſelf from the trammels of the ſociety, and became a diſtinguiſhed member of the French Academy and the Academy of Inſcriptions and Belles Lettres. In 1710 he was nominated Greek profeſſor in the college royal, a poſt which he retained till his death in 1722. He was profoundly ſkilled in the ancient languages, of which he gave proof by his various publications: of theſe the chief were "Memoirs of the Academy of Inſcriptions," and "Hiſtoire de la Poeſie Françoiſe," which ranks very high, on account of its curious reſearches. Moreri.

MASSILLARGUES, in *Geography*, a town of France, in the department of the Herault; 12 miles E.N.E. of Montpellier.

MASSILIA, *Portus Græcorum* (*Marſeilles*), in *Ancient Geography*, a celebrated city of Gaul, in Gallia Narbonenſis, and denominated by Cicero the Athens of the Gauls. Livy ſays that it was as much poliſhed as if it had been in the midſt of Greece. It was as much diſtinguiſhed for its ſciences and arts as for its commerce, and alſo for the variety and eminence of its colonies. Cæſar ſays that it was almoſt ſurrounded on three ſides by the ſea, and on the other land ſide very ſtrong, partly by its ſituation, and partly by a deep ditch, which guarded its ramparts. Strabo ſays that it was large, encompaſſed by good walls, and ſituated on a hill in the form of an amphitheatre above its harbour. This town was founded by a colony from Phocæa, a celebrated city of Ionia. Two perſons were deputed for this purpoſe, who carried with them a number of perſons of both ſexes, together with various inſtruments adapted to the mechanic arts and to agriculture, and alſo the laws according to which the colony was to be governed. They were directed by the oracle to touch at Epheſus, and to put themſelves under the conduct of the perſon whom Diana ſhould point out to them. A female was warned by Diana of their arrival in a dream, and ordered to take with her one of her ſtatues, and to accompany theſe ſtrangers. She alſo took from the temple ſome of the ſacred fire, which was to be perpetuated in the new temple that was to be erected at Marſeilles in honour of the goddeſs by whom ſhe was deputed. The firſt object of attention to the Phocæans, when they entered the gulf where they were to build this city, was to gain the protection and favour of the prince who reigned in this country. On the day of their arrival the daughter of the prince was to be married: and, according to the cuſtom of the Gauls, ſhe preſented a cup of water to the object of her choice. One of the Phocæans engaged her affection and attachment, and to him ſhe preſented the ſignificative cup. Her father approved

proved her choice, and aſſigned to the Phocæans a portion of land, where they eſtabliſhed themſelves in the firſt year of the 45th olympiad, or the 600dth year B.C. Allowing for the mixture of fable and truth in this relation, we may deduce from it the time when the city of Marſeilles was eſtabliſhed, and the country from which its founders emigrated. Having encompaſſed the new city with walls, and conſtructed a citadel for its defence, they eſtabliſhed a government upon the baſis of thoſe laws which they had brought with them, and decreed to Diana of Epheſus, who became the tutelar divinity of Marſeilles, a particular worſhip in the temple which they built for her, and of which the female who conducted them thither was the firſt prieſteſs. Agriculture and fiſhery were the objects of their attention and the ſources of their ſubſiſtence: they cultivated the vine and the olive, which were probably the firſt productions which they tranſplanted into Gaul. Our limits will not allow our tracing the particulars of their hiſtory through the viciſſitudes of ſubſequent centuries. For many ages they are ſaid to have maintained their original ſimplicity and frugality, and to have diſtinguiſhed themſelves by their hoſpitality to ſtrangers, and their compaſſion to the indigent. About 320 years B.C., Pytheas, an ingenious aſtronomer of this city, undertook to perfect navigation, and to diſcover countries whither they might extend their commerce. With this view he navigated northwards, and on his return, entered into the Baltic ſea. About the ſame time another citizen of ſimilar talents and purſuits, called Euthymenes, examined the weſtern coaſts of Africa, and reconnoitred the mouth of the Senegal. Theſe two voyages were undertaken at the expence of the republic. Theſe voyages, and other circumſtances, ſerved to extend their commerce and to improve their maritime power. Before the ſiege of this city by Cæſar, it had ſent its ſhips to the Levant, Africa, Spain, and England; and it held a principal rank among republics. During the diſputes between Pompey and Cæſar, Marſeilles took part with the former, and refuſed to open its gates to the latter, though he appeared before it at the head of three legions. Cæſar proſecuted the ſiege of the city, which, after long reſiſtance, and much internal diſtreſs, was obliged to ſurrender at diſcretion. The victor, in conſideration of the antiquity of the city, and the celebrity which it had acquired by its culture of the ſciences and arts, abſtained from the horrors of pillage; but deprived it of its dependant towns and colonies, and deſtroyed its fortifications and warlike machines, and having demanded the ſurrender of its arms, veſſels, and money, placed in it a garriſon of two legions. Contenting himſelf, however, with diſarming the inhabitants, he allowed them to live under their own laws and to enjoy the advantages of commerce. From the capture of the city to the time when Auguſtus became ſole maſter of Rome, nothing particularly worthy of notice happened in this province. For about a century afterwards, this city was governed under the form of a republic, enjoying the protection and ſubject to the authority of the Roman empire. Marſeilles, having enriched itſelf by its induſtry and frugality, became, at length, the victim of luxury and extravagance, inſomuch, that in the ſecond century of the Chriſtian era, the inhabitants gave occaſion for the proverb, "Maſſiliam naviges," to expreſs a diſpoſition for a life of debauchery. About the year 150, the Chriſtian religion was introduced into this city. Maſſilia produced a number of perſons diſtinguiſhed by their proficiency in ſcience and literature. We have already mentioned Pytheas and Euthymenes. To theſe we may add Teron and Gyaræus, who flouriſhed about 75 years before our era, and were celebrated aſtronomers and mathematicians; Oſcus or Oſcius, born about 20 years B.C., a celebrated orator; Agrotas of the ſame character, and the contemporary of the former, who pleaded only in Greek; Pacatus, Petronius, Demoſthenes, Crinas and Charmis, of whom the three laſt mentioned were celebrated phyſicians: the firſt an orator, and the ſecond a poet.

In the cabinets of collectors are many medals of this city in ſilver and in bronze. The moſt common of the firſt ſort have the head of Diana on one ſide, and a lion on the reverſe. Thoſe which have the head of Apollo and the two letters M A, are very common. The medals of Marſeilles diſcovered in 1771, about four leagues from Aix, were of pure ſilver, and all of them had the head of Diana, with a lion on the reverſe. See MARSEILLES.

MASSILLON, JOHN BAPTIST, in *Biography*, a French prelate, of great celebrity as a preacher, was born in 1663. At the age of eighteen he entered into the congregation of the Oratory, where he diſtinguiſhed himſelf by his talents and agreeable manners. In proceſs of time, he was appointed divinity profeſſor at Vienne, and it was in this place that he made his firſt efforts in eloquence, on occaſion of the death of Henry de Villars, archbiſhop of that city, whoſe funeral oration he pronounced. Soon after this he removed to Paris, where he adopted a mode of preaching that was peculiarly his own: his ſtyle and language were ſimple, elegant, and perſpicuous; his imagination lively, his images ſtriking and natural; his thoughts juſt and delicate; and his repreſentations animated and forcible. His manner of delivery likewiſe was admirably adapted to give ſucceſs to the kind of eloquence to which his genius directed him. The fame of Maſſillon excited the curioſity of the king to hear him; he was appointed to preach a courſe of ſermons at Verſailles, and the church was crowded with auditors. It was on one of theſe occaſions that Lewis XIV. paid him this fine compliment: "My father," ſaid he, "I have often had my pulpit filled by celebrated orators, with whom I am greatly pleaſed, but whenever I hear you, I am much diſpleaſed with myſelf." In the year 1717, he was nominated to the biſhopric of Clermont, but before his conſecration he was called on to preach a courſe of Lent ſermons before the young king, Lewis XV.: theſe, being ten in number, are known by the name of *Le petit Carême*, and were compoſed by the author in leſs than ten months, and are ſaid by d'Alembert to exhibit a model of true pulpit eloquence. After having been called to ſome public ſervices, ſuch as pronouncing the funeral oration for Elizabeth Charlotte of Bavaria, ducheſs dowager of Orleans, and having obtained other church preferment, he ſpent the remainder of his life almoſt entirely in his dioceſe, diligently occupied in the diſcharge of his epiſcopal functions, and gaining the affections of all claſſes of the people. He died in 1742, about the age of ſeventy-nine, deeply lamented by the flock over which he preſided, and that had been accuſtomed to regard him with filial reverence and affection. His works were collected and publiſhed by his nephew, in the years 1745 and 1746, in 14 vols. 12mo. They contain a complete "Courſe of Sermons for Advent and Lent:" "The Petit Carême:" "Funeral Orations," &c. Moreri.

MASSIMA, Ital. *Maxima*, Lat. in *Muſic*, the longeſt note in the firſt time-table of the early contrapuntiſts. Its form is an oblong ſquare, with a tail to it, thus: It is equal in duration to two longs, four breves, and eight ſemi breves.

MASSINA, in *Geography*. See MASINA.

MASSING, in *Painting*, the art of producing an union of effect in the various parts of a picture.

Upon the ingenuity with which the fmaller parts are united together, either by blending their edges or merely approximating them, and thus forming the larger maffes of light, fhade, or colour, depends all the beauty of chiaro-fcuro, and it can only be agreeably effected by the hand of tafte. It has been generally agreed amongft artifts and connoiffeurs, that in order to make a picture agreeable it fhould have three diftinct maffes of light, one larger, and two fmaller ones. The arrangement and fcale of them are arbitrary.

The manner employed by fir Jofhua Reynolds to inform himfelf of the mode in which the great artifts of Italy had regulated their works with regard to the general maffes, is fimple, and fo completely effective, that nothing farther than a tranfcript of it need be added for the benefit of thofe who are purfuing the art. In note 39 to Mafon's tranflation of Frefnoy's poem on painting, he fays, "When I was at Venice, the method I took to avail myfelf of their principles was this. When I obferved any extraordinary effect of light and fhade in any picture, I took a leaf of my pocket-book, and darkened every part of it, in the fame gradation of light and fhade as the picture, leaving the white paper untouched to reprefent the light; and this without any attention to the figures. A few trials of this kind will be fufficient to give the method of their conduct in the management of their lights. After a few experiments I found the paper blotted nearly alike. Their general practice appeared to be, to allow not above a quarter of the picture for the light, including in this portion both the principal and fecondary lights, another quarter to be as dark as poffible, and the remaining half kept in mezzotint, or half-fhadow."—"By this means you may alfo remark the various forms and fhapes of thofe lights; what portion is ftrongly relieved, and how much united with the ground."—And in note 41 he adds, "the fame method may be ufed to acquire that harmonious effect of colours, by adding colours to the darkened paper, to afcertain the quantity of warm and the quantity of cold colours."—"The predominant colours of a picture ought to be of a warm mellow kind, as red or yellow, and no more cold colour introduced than will be juft enough to ferve as a ground, or foil to fet off, and give value to the mellow colours; and never fhould itfelf be a principal. For this purpofe a quarter of the picture will be fufficient; thofe cold colours, whether blue, grey, or green, are to be difperfed about the ground, or furrounding parts of the picture, wherever it has the appearance of wanting fuch a foil; but fparingly employed in the maffes of light." For further information on this point, fee the articles CLAIR-OBSCURE, and EFFECT.

MASSINGALES, in *Geography*, a place of America, in Sullivan's county, Teneffee, in which is a poft-office; 427 miles from Wafhington.

MASSINGER, PHILIP, in *Biography*, an Englifh poet and dramatic writer, was born in 1584 at Salifbury. His father, Arthur, was in the fervice of Henry, fecond earl of Pembroke, in whofe family Philip was probably educated. His college ftudies he purfued at St. Alban's hall, Oxford; but it is afferted by Anthony Wood, that in the univerfity he gave his mind more to poetry and romance, than to the ftudies of the place. He left his college without a degree, and his father being dead, he found no other means of fupport than the employment of his talents as a writer for the ftage. From 1606 to 1622, a fpace of 16 years, he was fcarcely known to the public in the profeffion he had embraced: he was during that period probably employed in giving affiftance to other writers of more celebrity, and there is good reafon for believing that he was a coadjutor to Fletcher in fome pieces that bore his name, though he was in fuch embarraffed circumftances, as to fupplicate the loan of almoft the fmalleft fum to prevent him from being fent to gaol. In the laft of the years above-mentioned, his firft printed play made its appearance under the title of the "Virgin-Martyr." There are few facts on record refpecting the life of Maffinger: it appears, however, that, in his circumftances, he never rofe above indigence, and that from his own dedications he would have found it difficult to fubfift, had he not received the aid of liberal benefactors. He died of a fudden indifpofition in the month of March 1640, and was buried by the fide of Fletcher, in the church-yard of St. Saviour's, Southwark. The lift given of plays compofed either wholly or in part by Maffinger amounts to thirty-eight, of which feventeen only are printed in the moft complete edition. They are but little known, nor have any of them the prefent poffeffion of the ftage, excepting his comedy of "A New Way to pay old Debts," which is fometimes acted. His chief excellence is in tragedy, and according to an approved critic, "it would not be eafy to name one of the early Englifh dramatifts who has furpaffed him in harmony of verfe and beauty of language, or in ftrength of character. His popularity was never equal to that of Shakfpeare, Jonfon, Beaumont, and Fletcher: his pieces have the irregularity of plot common at that period, with a mixture of low and grofs fcenes; the portraits are drawn more from general ideas of his own conception, than from the obfervation of real nature; and his knowledge of the human heart is much inferior to that of Shakfpeare, to whom, in fome refpects, there is a great fimilarity. His morality is generally pure, though his language is often grofs and indelicate." The beft edition of his works is that of Mr. Gifford, in four volumes, 8vo. 1805, to which the reader is referred for a more full account of the author.

MASSINISSA was an African prince of great fame; he was the fon of Gala, king of the Maffyli, one of the tribes compofing the Numidian nation. In the year 213, B. C. Maffiniffa, then about 17 years of age, was fent by his father, who had made a treaty with the Carthaginians, againft Syphax, king of another tribe of the Numidians, whom he twice defeated. After this he ferved at the head of the Numidian auxiliaries of the Carthaginians in Spain, and had a large fhare in the defeat and death of the two Scipios. When young Scipio had reftored the Roman fuperiority in that country, Maffiniffa privately entered into a negociation with him and became an ally of the Romans; and to his exertions they owed many of their victories in Africa. After the death of his father, his eldeft brother, and his nephew, Maffiniffa, who had been deprived of his inheritance, obtained fuccours from Bocchar, king of Mauritania, expelled his competitors, and placed himfelf on the Maffylian throne. Syphax, dreading his ambition and martial talents, attacked him with a numerous army, and, gaining a fignal victory over Maffiniffa, obliged him to take refuge on mount Balbus. From this place he made frequent incurfions on the adjacent Carthaginian territory, and proved fo troublefome, that Syphax fent againft him one of his moft active commanders, with orders to bring him either dead or alive. He was now under the neceffity of concealment, and actually lived for a time in a cave, fupported by the plunder of his two attendants. At length he refolved to make an attempt at recovering his kingdom, and being joined by a number of partifans, he not only recovered the throne of the Maffyli, but was able to make incurfions on the dominions of Syphax. In the battle of Zama, Maffiniffa greatly contributed to the defeat of the great Hannibal, and the Romans, who had been frequently the fpectators of his courage and valour, rewarded his fidelity with

with the kingdom of Syphax, and fome of the Carthaginian territories. At his death, Maffiniffa fhewed the confidence he had in the Romans, and the high eftimation in which he held the rifing talents of Scipio Æmilianus, by entrufting him with the care of his kingdom, and empowering him to divide it among his fons. He was more than ninety years of age when he died, and had reigned about fixty years. He experienced adverfity as well as profperity, and in the early periods of his reign he was expofed to the greateft danger, and was, as we have feen, often obliged to fave his life by feeking a retreat among his favage neighbours. His alliance with the Romans was the beginning of his greatnefs, and ever after this he lived in the higheft ftate of affluence. He is remarkable for the large fhare of health he enjoyed to the laft. Toward the clofe of his life he was feen at the head of armies, exerting himfelf with the moft indefatigable activity and ardour, and he often remained for many fucceffive days on horfeback without a faddle under him, or a covering for his head. He affigned the ftrength of his mind and the vigour of his body, chiefly to the great temperance which he obferved. He was feen eating brown bread at the door of his tent, like a private foldier, the day after he had obtained an immortal victory over the armies of Carthage. He left fifty-four fons, of whom three only were legitimate, *viz.* Micipfa, Gulaffa, and Manaftabal. At his death he was the moft powerful prince in Africa, his territories extending from Mauritania, to the weftern borders of Cyrenaica. His army at this time was numerous and well difciplined, and his treafury was full: he was undoubtedly one of the ableft fovereigns of his age, though little fcrupulous in the means which he reforted to for his aggrandizement. Univer. Hift.

MASSISA, in *Geography*, a town of Afiatic Turkey, in Aladulia; 12 miles E. of Adana.

MASSIVE, fomething heavy and folid; a term ufed in oppofition to tendernefs and delicacy.

Thus we fay, a building is too maffive, that is, its walls are too thick; a wall is maffive, that is, the lights and openings are too fmall in proportion.

MASSIVE *Column*. See COLUMN.

MASSON, M. in *Biography*, author of "A Treatife on Compofition" in French, publifhed in 1705, and much efteemed till that of Rameau appeared, in 1722. The author was maître de chapelle at Chalons, in Champagne. This work is divided into two parts; of which the firft treats of melody, the fecond of harmony. The firft part contains feven chapters, and the fecond ten; proceeding from two parts to four, and ending with inftructions for compofing a fugue.

MASSON, JOHN, a learned writer of the reformed church, was born in France, from which, on account of his religious opinions, he was obliged to make his efcape, and became a refugee in England. From thence he paffed into Holland. In 1708 he publifhed, at Leyden, the lives of Horace and Ovid, in Latin: after this he wrote the life of Pliny the younger, prefixed to a fplendid edition of his Epiftles, printed at Amfterdam in 1734. In the year 1712 he commenced a work, entitled "Hiftoire critique de la Republic des Lettres," which he carried to fixteen volumes, 12mo. Maffon is, likewife, fuppofed to be the author of the "Hiftory of Peter Bayle, and his Works."

MASSON, FRANCIS, a name which ranks very high among thofe who, by encountering perfonal difficulties and hardfhips, with the moft indefatigable and difinterefted zeal, have promoted botanical knowledge, was born at Aberdeen in Auguft 1741. Whether he was originally educated as a gardener, or at what time he found his way to London, we are not informed. It appears that, having been for fome time known to the late excellent fuperintendant of the Royal Garden at Kew, Mr. Aiton, and probably employed under him there, he was fixed upon as a fit perfon to undertake fome botanical expedition, for the purpofe of enriching that collection, when the return of the celebrated Banks and Solander from their voyage round the world, gave a popularity and a ftimulus to every exertion in favour of natural fcience. We believe the eftablifhment of a travelling botanift in the king's fervice, if not fuggefted by the firft-mentioned of thefe eminent men, was planned entirely under his advice and direction. In 1771 or 1772, Mr. Maffon was difpatched to the Cape of Good Hope. That country had been, for near a century, celebrated as a mine of botanical riches, which had fcarcely reached our gardens but through the medium of thofe of Holland. The works of Hermann, Commelin, Burmann, Breynius, and others, had fufficiently evinced the abundance of thefe treafures; but comparatively few of them had been procured in a living ftate, or cultivated with fuccefs, even by the Dutch themfelves; and of thofe but a very fmall portion had, from the time of the firft earl of Portland, when he came over with king William, to our days, come into general cultivation in England. The writer of this well recollects the pleafure which the novel fight of an African Geranium, in Yorkfhire and Norfolk, gave him about forty years ago. Now every garret and cottage-window is filled with numerous fpecies of that beautiful tribe, and every greenhoufe glows with the innumerable bulbous plants and fplendid heaths of the Cape. For all thefe we are principally indebted to Mr. Maffon, befides a multitude of rarities, more difficult of prefervation or propagation, confined to the more curious collections. Many of thefe perhaps have only furvived to bloom once or twice within the walls to which they were firft configned; to be defined and named by the fkill of a Solander, a Dryander, or of the younger Linnæus in his tranfient vifit among us, and have then difappeared. Such has unavoidably been the cafe with many of the Orchis tribe, for want of our knowledge of their requifite treatment; while many of the *Liliacei* have flowered on their arrival, but though their bulbs have continued to exift, they have feemed rather to languifh than to flourifh, for want of their native arid foil and burning fun. Such deficiencies and difappointments indeed were fcarcely felt while Mr. Maffon continued at the Cape, fo abundant and repeated were his fupplies. The Dutch appear not to have reftrained his inquiries or acquifitions. He was allowed to travel many hundred miles up the country, and we have often heard him recount his adventures. At length, his harveft having been judged, for the prefent, fufficiently abundant, he was, in 1776, ordered to explore the Canary iflands, the Azores, Madeira, and part of the Weft Indies, efpecially the ifland of St. Chriftopher. In this miffion he employed about five years more, and returned to England in 1781.

During his ftay at the Cape, he entered into correfpondence with the great Linnæus. Having difcovered a bulbous plant of a new genus, he was not only laudably ambitious of botanical commemoration in its name, but he was particularly anxious, as appears by one of his letters, to receive this honour from no lefs a hand than that of his illuftrious and venerable correfpondent. This indeed was the "*unicum premium*," the only reward to which he afpired for all his labours. That he fought no pecuniary advancement, the extreme flendernefs of the ftipend which could be obtained for him, and his difregard of fuch objects at all times, abundantly evinced. He obtained the honour to which he afpired. The fpecimen of *Maffonia* in the herbarium of Linnæus,

 named

named by his own trembling hand near the close of his life, proves that the name had his fanction, though it appears from the *Supplementum Plantarum*, p. 27, to have been originally fuggefted by Thunberg, in whofe company Maffon botanized for two years at the Cape. This juftice rendered to the merits of our botanical traveller, was finally crowned by the publication of plates of two fpecies of *Maffonia*, in the *Hortus Kewenfis* of his friend Aiton, a book which he had fo eminently contributed to enrich, by his difcoveries in various parts of the world. Before that book appeared however in 1789, he had, in 1783, vifited Portugal and Madeira, and had returned to the Cape of Good Hope in 1786. He now combined experience and forefight with zeal and activity. He was prepared to take advantage of different feafons; in fome to collect fpecimens, in others roots or feeds; fo as beft to make up for former deficiencies or loffes; and he had already made himfelf acquainted with the various fituations, or tracts of country, moft promifing for every purpofe. In confequence of this knowledge, it was fettled, in confultation with his able advifer, fir Jofeph Banks, that his travels fhould now be reftrained to within forty miles of the Cape town. That fpace of country was found to be as yet inexhaufted, and almoft perhaps inexhauftible, as to what it might afford for our gardens, and the expence as well as labour of the undertaking was, by this plan, greatly leffened.

Mr. Maffon returned to England again in 1795, and fpent two years there among his botanical friends, feeing the produce of his exertions every day blooming around him, at Kew and at Hammerfmith, his refidence at Kenfington placing him within reach of the principal botanic gardens, as well as at a moderate diftance from the great theatre of fcientific and literary information in Soho fquare.

A life of fo much leifure foon became irkfome, to a man who had been ufed to fo much bodily exertion, and mental recreation, amid the wild and novel fcenes of nature, and he folicited another miffion. This was obtained from his royal mafter, at the recommendation of his former friend and patron; and he was fent to explore fuch parts of North America, under the Britifh government, as appeared moft likely to produce new and valuable plants. This was truly a national project, worthy of thofe who planned it; the vegetable productions of that country, from the hardinefs of their conftitution, being not merely objects of curiofity, tafte, or luxury, but capable of being naturalized among us, for the probable benefit of our arts, our domeftic and rural economy, our kitchen gardens and farms, as well as of our fhrubberies and parterres. The fuccefs of our traveller was equal to the expectations that had been formed. New plants, of interefting characters and properties, fprung up under his fteps, and it feemed probable that much practical knowledge was likely to refult from his difcoveries, even through the experience and converfe of the wild inhabitants of thofe little explored regions. So others have found who have followed Mr. Maffon; for he furvived not to reap or to communicate more than a foretafte of thefe advantages. He died about Chriftmas, 1805, in the fixty-fifth year of his age, at Montreal, in Canada. What little property he left, fell into the hands of two of his nephews, and confifted chiefly of the journals of his various travels, drawings, and collections of dried plants or other natural productions. Some of thefe relics have been purchafed by the prefent Mr. Lee of Hammerfmith, a worthy friend of their original poffeffor. From him, or from our own perfonal knowledge, moft of the above particulars are derived; the dates only being taken from the fhort mention of our deceafed friend, communicated by the prefent Mr Aiton, to Sims and Konig's Annals of Botany, v. 2. 592. We cannot conclude better than in Mr. Lee's own words. "Maffon was of a mild temper, perfevering in his purfuits, even to a great enthufiafm. Of great induftry; which his fpecimens and drawings of fifh, animals, infects, plants, and views of the countries he paffed through, evince. And though he paffed a folitary life, in countries diftant from fociety, his love of natural hiftory never forfook him. Characters like him feem for the prefent dwindling in the world, but I truft they will revive. If a felection of his *memoranda* would be acceptable to the world, there is matter enough to carry it to a great extent."

Mr. Maffon publifhed, in 1796, a fplendid work on the genus *Stapelia*, confifting of a thin folio volume, with forty-one coloured plates of as many fpecies, almoft entirely nondefcript, accompanied by defcriptions. This volume is dedicated to the king, in the fame refpectful and feeling ftyle as the firft edition of Mr. Aiton's *Hortus Kewenfis*; and we think we perceive traces of the fame able and judicious pen in both. S.

MASSONIA, in *Botany*, fo called in honour of the late Mr. Francis Maffon; fee the preceding article. The younger Linnæus obferves in his *Supplementum*, where the prefent genus was firft publifhed, that he was indebted to Mr. Maffon for all the Canary plants defcribed in that work.—Linn. Suppl. 27. Thunb. Nov. Gen. 39. Schreb. 216. Willd. Sp. Pl. v. 2. 28. Mart. Mill. Dict. v. 3. Ait. Hort. Kew. ed. 2. v. 2. 209. Juff. 53. Lamarck Illuftr. t. 223. —Clafs and order, *Hexandria Monogynia*. Nat. Ord. *Spathaceæ*, Linn. *Afphodeli*, Juff.

Gen. Ch. *Cal.* none. *Cor.* Petals fix, inferted on the outfide of the nectary, lanceolate, ftraight, fpreading. Nectary inferior, cylindrical, membranous, of one leaf, with fix ftreaks, and as many teeth. *Stam.* Filaments fix, awl-fhaped, incurved, equal, rather longer than the petals, inferted into the teeth of the nectary; anthers ovate, incumbent. *Pift.* Germen fuperior, three-lobed; ftyle thread-fhaped, curved; ftigma nearly fimple. *Peric.* Capfule triangular, fmooth, of three cells and three valves, burfting at the angles, which are extended upwards into three fhort, rounded, erect wings. *Seeds* numerous, globofe, fomewhat angular, fmooth.

Eff. Ch. Nectary inferior, tubular. Petals fix, equal, inferted on the outfide of the nectary. Capfule with three wings, three cells, and many feeds.

1. M. *latifolia.* Broad-leaved Maffonia. Linn. Suppl. 193. Ait. Hort. Kew. ed. 1. v. 1. 405. t. 3. Thunb. Nov. Gen. 4 . Curt. Mag. t. 848.—Leaves nearly orbicular, depreffed, perfectly fmooth.—Native of the diftrict of Roggefeldt, at the Cape of Good Hope, where it bloffoms in September and October. In our greenhoufes the flowers are produced in March and April. It was fent to Kew in 1775. The *root* is a round bulb. *Stem* none. *Leaves* two, radical, depreffed, fpreading widely on the ground in oppofite directions, each from three to fix inches long, nearly orbicular but fomewhat pointed, entire, obfcurely ribbed, flefhy, quite fmooth; dark green above, with feveral purple fpots towards the extremity; paler and fpotlefs beneath. *Flowers* numerous, in a feffile radical head or tuft, between the leaves, each flower accompanied by an ovate leafy *bractea*, about equal to the nectary, or longer. The whole *corolla* is greenifh, its petals deflexed. *Stamens* much longer than the petals, ftout, purple, with yellow anthers.

2. M. *muricata.* Prickly leaved Maffonia. Ker in Curt. Mag. t. 559.—Leaves nearly orbicular, depreffed, prickly on the upper fide towards the point.—Native of the Cape; introduced by Mr. Maffon to Kew garden in 1790. It differs

fers from the laſt eſſentially in the prickles of the *leaves*. The *flowers* moreover are white in every part, except the anthers before they burſt, and the very tumid rim of the *nectary*, which are of a blueiſh green. The *nectary* itſelf is deſcribed by Mr. Ker as brimful of honey, which ſurely juſtifies its Linnæan and Thunbergian appellation, though the ingenious author we have quoted, prefers calling it merely the tube of a monopetalous corolla. To us the petals in this genus, as in *Narciſſus*, appear totally diſtinct in nature and ſubſtance, as they often are in colour, from the nectariferous tube.

3. M. *ſcabra*. Shagreen-leaved Maſſonia. Andr. Repoſ. t. 220. (M. puſtulata; Jacq. Coll. v. 4 177. Ker in Curt. Mag. t. 642. Redout. Liliac. t. 183.)—Leaves nearly orbicular, depreſſed, their upper ſide covered with prominent tubercles.—Sent by Mr. Maſſon from the Cape in 1790. It flowers here from January to April, and is ſaid in the Bot. Mag. to be as eaſy of culture as any other Cape bulb. This ſpecies has the habit and ſize of the two preceding, but differs in having the whole upper ſurface of the *leaves* beſprinkled with innumerable, ſmall, prominent puſtules, or tubercles. The *flowers* are of a greeniſh-white, the rim of the nectary being of a deeper green than the reſt. The *bracteas* are broad, and cloſely laid over each other. *Stamens* and *ſtyle* tall, ſlender and white; the *ſtigma* minutely three-cleft, fringed.

4. M. *echinata*. Rough-leaved Maſſonia. Linn. Suppl. 193. Thunb. Nov. Gen. 41. Ait. n. 4.—Leaves ovate or lanceolate, depreſſed, their upper ſide covered with hairy tubercles. Petals very narrow.—Sent from the Cape by Mr. Maſſon in 1790. It ſeems not yet to have found its way, even once, into our periodical publications. It is ſaid in the *Hortus Kewenſis* to flower in May. Thunberg deſcribes the *bulb* as ſcarcely ſo big as a hazle-nut. *Leaves* two, ovate, blunt with a point, ſmaller than any of the former, covered with prominent tubercles and white hairs.

5. M. *pauciflora*. Few-flowered Maſſonia. Ait. n. 5.—Leaves lanceolate or elliptical, veinleſs, covered with naked tubercles. Petals ovate.—Sent with the three laſt from the Cape, by Mr. Maſſon, in 1790. It is ſaid to flower in May.

6. M. *anguſtifolia*. Narrow-upright-leaved Maſſonia. Linn. Suppl. 193. Ait. Hort. Kew. ed. 1. v. 1. 405. t. 4. Ker in Curt. Mag. t. 736. (M. lanceolata; Thunb. Nov. Gen. 40.)—Leaves oblong-lanceolate, aſcending, ſmooth. Tube of the nectary long and cylindrical; mouth cloſed. Found by Thunberg on the ſummit of the Onderſte Roggefeldt mountain at the Cape, flowering in Auguſt, it being there a winter plant. This was ſent over with the firſt ſpecies, by Mr. Maſſon, in 1775, and flowers here from January to April, increaſing by offsets and ſeeds without difficulty. The *leaves* differ in their upright poſition from all the foregoing. They are ſmooth like *M. latifolia*, but much narrower, and not ſpotted. The *flowers* are fragrant like a hyacinth, white, with purple anthers, and a ſlender tube, twice or thrice as long as the petals, nearly cloſed at its mouth by the tumid baſes of the filaments.

7. M. *undulata*. Waved-leaved Maſſonia. Thunb. Nov. Gen. 41. Ait. n. 7. Willd. n. 3.—Leaves upright, lanceolate, waved, ſmooth.—Found by Thunberg in the inland country above the Cape of Good Hope, and ſent by Mr. Maſſon, in 1791, to Kew, where it flowers in April. *Bulb* the ſize of a hazle-nut. *Leaves* radical, three, four or five, very narrow in their lower part, lanceolate, waved, erect, about a finger's length. *Flowers* in a denſe umbel, raiſed upon a common ſtalk, rather ſhorter than the foliage.

8. M. *enſifolia*. Trumpet-flowered Maſſonia. Ker in Curt. Mag. t. 554. Ait. n. 8. (M. violacea; Andr. Repoſ. t. 46. Mauhlia enſifolia; Thunb. Prod. 60. t. 3. Agapanthus enſifolius; Willd. Sp. Pl. v. 2. 48. Polyanthes pygmæa; ibid. 165. Jacq. Ic. Rar. t. 380.)—Leaves lanceolate, ſpreading, ſmooth. Tube of the nectary five times longer than the recurved petals, ſwelling gradually upwards, open-mouthed. Three ſtamens ſhorter than the reſt.—Native of the Cape, where it was gathered by Thunberg and Maſſon, but introduced into this country by Mr. Williams of Turnham-Green, who is recorded to have raiſed it from Cape ſeeds in 1790 or 1791. It flowers from September to February. The *leaves* are two only, and moſt reſemble thoſe of *M. anguſtifolia*. The *flowers* grow in a rather denſe, ſhort-ſtalked cluſter, and are of a pale lilac hue, very remarkable for their long, ſlender, gently-ſwelling tube or nectary, their minute *bracteas*, and unequal *ſtamens*. Theſe circumſtances, and the habit of the plant, have cauſed much difference of opinion reſpecting its proper genus, and Cavanilles, it ſeems, has made it a *Hyacinthus*, to which the good ſenſe of Dr. Sims appears to have diſpoſed him to aſſent, and we confeſs ourſelves much of the ſame opinion. But Mr. Ker has thought otherwiſe, and he is followed by the editors of the Hort. Kew. Jacquin's excellent figure ſhews the capſule to be deficient in the dilatations or wings proper to *Maſſonia*, nor is there any line of diſtinction to be drawn between the nectary and petals; which Mr. Ker uſes as an argument for conſidering the nectary and petals as one in the real *Maſſoniæ*, where they appear to us to be very diſtinct. We propoſe our doubts merely for the ſake of truth, and by no means for controverſy.

MASSONIA, in *Gardening*, compriſes plants of the herbaceous bulbous-rooted flowery perennial kind, of which the ſpecies cultivated are, the broad-leaved Maſſonia (M. latifolia); and the narrow-leaved Maſſonia (M. anguſtifolia.)

Method of Culture.—Theſe plants may be increaſed by planting the offsets from the roots, when the leaves drop off, in pots of ſandy earth, plunging them in a hot-bed in the ſtove. And they are likewiſe capable of being raiſed from ſeeds, ſown in pots of the ſame ſort of earth, plunging them in a hot-bed in the houſe.

Afterwards the plants ſhould have a free air in the green-houſe, where they muſt be kept.

They are capable of affording variety in theſe collections.

MASSORAH, in *Geography*, a town of Hindooſtan, in Bahar; 23 miles E.S.E. of Bahar. N. lat. 53° 37′. E. long. 15° 5′.

MASSOUDI, in *Biography*, the ſurname of Aboul Haſſan Ali, a celebrated Arabian geographer and hiſtorian, deſcended from Maſſoud Ebn Maſſoud, one of the moſt confidential friends of Mahomet, flouriſhed in the tenth century. He was author of a work, entitled, according to our tranſlation, "Golden Meadows and Mines of precious Stones," which he wrote in the year 336 of the Hegira. It is an hiſtorical and geographical treatiſe, compriſed in two volumes: the firſt of which commences with the creation of the world, and comes down to the birth of Mahomet; and the ſecond continues the hiſtory from that date to the author's time. He is author of another hiſtory, entitled "A Regiſter of the Lands of Egypt." Other works are attributed to him, and, among theſe, the following is the principal: "A Hiſtory of Inſurgents at various Periods againſt lawful Authority, and particularly that of the Chaliphs." He died at Grand Cairo in Egypt, in the year 346 of the Hegira. There was another perſon of this name, who wrote a hiſtory of Syria and Damaſcus, entitled, according to the Engliſh verſion of it, "The Garden of Syria,"

Syria," and a treatife "On the Conjugation of the Arabic Verbs."

MASSOW, in *Geography*, a town of Hinder Pomerania; 9 miles N. of Stargard.

MASSOWAH, Masuah, or *Matfuah*, meaning, fays Bruce, the port or harbour of the fhepherds, a fmall ifland of the Red fea, near the coaft of Abyffinia, in a bay, with an excellent harbour, governed by a chief called the Naybe of *Arkeeko;* which fee. The water in the harbour is deep enough for fhips of any fize, which may ride in it fecure from any wind. It was called by the Greeks "Sebafticum Os," from the capacity of its port, which is diftributed into three divifions. The ifland itfelf is very fmall, fcarcely three-quarters of a mile in length, and about half that in breadth: one-third occupied by houfes; one by cifterns or tanks, of which there are about thirty, to receive the rain-water; and the laft referved for burying the dead. When Arabia Felix was conquered by the arms of Selim, emperor of Conftantinople, Mafuah was a place of great commerce, poffeffing a fhare of the Indian trade, in common with the other ports of the Red fea near the mouth of the Indian ocean. Its exports were brought to it from an inhofpitable and almoft inacceffible mountainous country behind it: thefe confifted of gold and ivory, elephants' and buffaloes' hides, and, above all, flaves. Along its coaft were found pearls, confiderable for fize, water, or colour. As long as commerce flourifhed, Mafuah continued to be a place of much refort; but it fell into obfcurity very fuddenly under the oppreffion of the Turks, who completed the ruin of the Indian trade in the Red fea, which had commenced fome years before by the difcovery of the Cape of Good Hope, and the fettlements made by the Portuguefe on the continent of India. The firft government of Mafuah under the Turks was by a bafhaw fent from Conftantinople; but when it ceafed to be a place of trade, it was not thought worth while to keep up the expenfive eftablifhment of a bafhalik. In reward for the affiftance given to the Turks, when they conquered this place, by a tribe of Mahometans called Belowee, fhepherds inhabiting the coaft of the Red fea, under the mountains of the Habah, about lat. 14°, the Turks gave their chief the civil government of Mafuah and its territory, under the title of Naybe of Mafuah; who held it, after the bafhaw was withdrawn, of the grand fignior, for an annual tribute, upon receiving a firman from the Ottoman Porte. The janizaries, eftablifhed there as a garrifon, intermarried with the women of the country; and in confequence of thefe intermarriages, Moors and natives of Mafuah became mutually related, and always fubject to the influence of the Naybe. From motives of policy, it was agreed that one-half of the cuftoms fhould be paid by the naybe to the king of Abyffinia. Having thus fecured the friendfhip of Abyffinia, the naybe declined paying tribute to the bafhaw of Jidda, to whofe government he had been fubjected by the porte; and he afterwards declined paying a fhare of the cuftoms to the king of Abyffinia.

Mafuah was found by Mr. Bruce and his companions, as the refult of various obfervations of the fun and ftars, to be in N. lat. 15° 35′ 5″; and by an obfervation of the fecond fatellite of Jupiter, September 22, 1769, its longitude was fixed at 39° 36′ 30″ E. of Greenwich; the variation of the compafs being 12° 48′ W. As Loheia is nearly oppofite, (N. lat. 15° 40′ 52″,) the breadth of the Red fea between Mafuah and Loheia is 4° 10′ 22″; and fuppofing a degree to be equal to 66 ftatute miles, this breadth, in round numbers, will be 276 miles. The height of the barometer, on the 4th of October, at 6 in the morning, was 25° 8′ 2″; at 2 P.M., 25° 3′ 2″; and half paft 6 P.M., 25° 3′ 7″; and the greateft height of Fahrenheit's thermometer, *viz.* October 22, at 2 P.M., was 93°. Mafuah is very infalubrious, as is the whole coaft of the Red fea from Suez to Babelmandeb, but more efpecially between the tropics, and fubject to violent fevers, generally terminating in death on the third day. Fevers generally end in intermittents, and dyfenteries, always tedious and often mortal. Another difeafe, endemial in this country, is called "hanzeer," the hogs or the fwine, and is a fwelling of the glands of the throat, and under the arms; and another complaint confifts of fmall fwellings all over the body, but thickeft in the thighs, arms, and legs. Another diforder, common in thefe countries, is called "Farenteit," fignifying the worm of Pharaoh, which afflicts thofe who are in the conftant habit of drinking ftagnant water. This plague appears indifcriminately in every part of the body, but moft frequently in the legs and arms. This worm is feized by the natives gently by the head, and then wrapped round a thin piece of filk, or fmall bird's feather. Every day, or feveral times a day, they try to wind it upon the quill as far as it comes readily; and, upon the fmalleft refiftance, they defift for fear of breaking it. When this operation, which fometimes lafts for three weeks, terminates, the hole or puncture difcharges, by preffure, a fmall quantity of lymph; and in about three days it is healed without a fcar. The elephantias is alfo one of the endemial difeafes of the country.

At Mafuah it is a general cuftom for people to burn myrrh and incenfe in their houfes, before they open the doors in the morning; and when they go out at night, or early in the day, they have always a fmall piece of rag highly fumigated with thefe two perfumes, which they ftuff into each noftril, to keep them from the unwholefome air.

The houfes in Mafuah are, in general, built of poles and bent grafs, as in the towns of Arabia; but, befides thefe, there are about twenty of ftone, fix or eight of which are two ftories each. At Mafuah all the neceffaries of life are fcarce and dear, and in quality indifferent. The fame fort of money is in ufe at Mafuah and the oppofite coaft of Arabia. It is valued by the Venetian fequin: but glafs beads, called "contaria," of all kinds and colours, perfect and broken, pafs for fmall money, and are called, in their language, "Borjooke."

Table of the relative value of money.

Venetian fequin	=	$2\frac{1}{4}$ Pataka.
Pataka, or imperial dollar	=	28 Harf.
1 Harf	=	4 Diwani.
10 Kibeer	=	1 Diwani.
1 Kibeer	=	3 Borjooke or grains

The harf is likewife called dahab, meaning in Arabia gold, and frequently a fequin. The harf is 120 grains of beads.

The trade carried on at Mafuah is confiderable, though the ifland is narrow and confined, and the government unjuft and violent. The goods imported from the Arabian fide are blue cotton, Surat cloths, and cochineal ditto, called Kermis, fine cloth from different markets in India; cotton unfpun from ditto in bales; Venetian beads, cryftal, drinking and looking-glaffes; and kohol, or crude antimony. The three laft articles come in great quantities from Cairo, firft in the coffee-fhips to Jidda, and then in fmall barks to this port. Old copper is alfo an article by which the gain is great, and a large quantity is imported. The Banians were once the principal merchants of Mafuah; but in Bruce's time they were reduced to fix. They are filver-fmiths, that make ear-rings and other ornaments for the women on the continent, and are affayers of gold; but they make only a poor livelihood. As there is no water in Mafuah, the number

ber of animals belonging to it can be but ſmall. Bruce's Travels, vol. iii.

MASSOWBA, a town of Congo; 10 miles N. of Bombi.

MASSUET René, in *Biography*, a learned French Benedictine of the congregation of St. Maur, was born at St. Owen de Maucelies, in the dioceſe of Evreux, in 1665. He became diſtinguiſhed for his proficiency in ancient literature, particularly in the writings of the fathers and eccleſiaſtical antiquities. In 1710 he publiſhed a new edition of the works of St. Irenæus, in folio, more correct than any preceding editions, and accompanied with new notes and prefaces: he alſo added to it fragments of ſuch pieces of Irenæus as are no longer extant; and prefixed to the whole are three diſſertations, which reflect credit on his erudition, induſtry, and judgment. The firſt contains an account of the heretics againſt whom Irenæus wrote, and of their opinions; the ſecond, a hiſtory of his own life, actions, and writings; and the third of his opinions. He was engaged after this, by his ſuperiors, on a continuation of "The Lives of the Saints," and "The Annals of the Benedictine Order." He died in 1716, at the age of fifty. Moreri.

MASSURA, in *Geography*, a town of Hindooſtan, in Bahar; 45 miles S.S.W. of Bahar.

MAST *of a Foreſt*, the fruit of that genus of trees called *glandiferous*, or *maſt-bearing*; as beech, oak, cheſnut, &c.

Mast, in *Ship Building*, a large pole, or long piece of round timber, raiſed in veſſels, to which are attached the yards, ſails, and rigging, in order to their receiving the wind neceſſary for navigation.

The word maſt ſignifies the ſame thing in French, High-Dutch, Flemiſh, and Engliſh; the Italians uſe the word *albero*, and the Spaniards *maſtil*.

Maſts are long fir trees, or ſeveral fir trees coaked or douelled and bolted together, and cylindrically rounded a great part of their length, and, arching ſideways, are ſimilar to truncated cones.

Their number depends upon the ſize and nature of the veſſel, ſome having three lower maſts, which are called ſhips; ſome have two lower maſts, ſuch are brigs and ſnows; others only one maſt, ſuch are cutters, ſloops, and other ſmall trading-veſſels. Beſides the lower maſt, each veſſel has a bowſprit; and to complete the neceſſary heights of the maſts, and convenience in many reſpects, there is attached to the head of the lower-maſt, the top-maſt, and to the head of the top-maſt, the top-gallant-maſt, and ſometimes to the head of the top-gallant-maſt, a ſmall one, called a royal-maſt. To theſe ſeveral maſts are confined their reſpective yards and ſails, and conſequently the rigging for their ſupport.

An attempt has been lately made to introduce four or more maſts in veſſels; but, upon a very liberal trial, it was found not to anſwer the purpoſes intended: for when the number of maſts are multiplied, the yards muſt be ſhortened, or they would entangle each other in working. By this, too, the ſails would be narrowed, and would receive too ſmall a portion of wind for the force required. If, on the contrary, there is not a ſufficient number of maſts, the yards would be unmanageable, from their length. Experience, therefore, has proved, that, in large veſſels, three lower-maſts and a bowſprit, in ſmaller veſſels, two lower-maſts and a bowſprit, and in the ſmalleſt, one maſt and a bowſprit, are the moſt advantageous number for nautical purpoſes.

All large maſts, previous to the American war, were made of New England white pine, having been found the higheſt, and in all reſpects beſt ſuited to the purpoſe; but ſince then maſts from Riga have been procured. As the largeſt trees from that country ſeldom exceed twenty-four inches in diameter, and more frequently from nineteen to twenty-one, a much larger number of pieces was of courſe uſed in conſtructing made-maſts. From this circumſtance, and the nature of the wood being conſiderably heavier than white pine, the maſts now in uſe exceed the former ones by nearly one quarter in weight: but Riga maſts are conſiderably ſtronger than thoſe of New England.

The choice of trees for making maſts, yards, &c. to the beſt advantage, is of great importance; otherwiſe much unneceſſary waſte and expence muſt occur: and the greater number of trees any maſt is compoſed of, the more judgment is required to ſuit each tree to the neareſt ſize. The beſt method to attain this, is to draw upon a board or paper the ſeveral pieces the maſt is compoſed of, ſimilar to the *Plate of Maſts*, &c. Every tree ſhould be carefully examined whether it be ſound, and ſhould it be not quite ſtraight, if ſufficiently large, it might be made ſtraight, in putting the maſt together.

The beſt poſition, and indeed the heights of the maſts, ſhould be duly conſidered and aſcertained by the conſtructor or ſhip-builder, as it is only the buſineſs of the maſt-maſter to make them agreeable to the length or heights beſt ſuitable for the veſſel to bear, of which the former is the beſt judge.

The lengths and diameter of the maſts, &c. being given, the preſent mode of making a main-maſt is as follows. For a ſhip of 74 guns:

From the butt ſet up the heights of the decks upon a ſtraight line ſtruck along the middle, and the given length, which is one hundred and eleven feet; from which ſet back ſix inches for every yard in the length, for the heading and ſtop, or reſt for the treſtle-trees; five inches for the mizen-maſt, which is the upper part of the hounds; from thence ſet back ſix-thirteenths of the length of the head for the length of the hounds; and from thence, to produce the curve ſideways, ſet off the following diameters: and, firſt, the given diameter, which is thirty-ſeven inches, muſt be ſet off at the partners, which is at the middle-deck of three-deck ſhips, and the main deck of all others, and thirty-eight inches at the upper deck, in order to give the hoops a quicker drift; and this equally from a ſtraight line along the middle: then divide the diſtance from the upper part of the hounds to the partners into four quarters or equal diſtances, terming that next the partners the firſt quarter, the next the ſecond, and ſo on.

Then ſet off, as before, at the firſt quarter, thirty-ſix inches and three-eighths, or ſixty ſixty-one parts of the given diameter; and at the ſecond quarter thirty-four inches and three-quarters, or fifteen-ſixteenths; at the third quarter thirty-two inches and a half, or ſeven-eighths; and at the lower part of the head, the thwart-ſhip way, thirty-two inches and a half, or ſeven-eighths; and the fore and aft-way twenty-ſeven inches and three-quarters, or three-fourths; and at the upper part of the head twenty-three inches and an eighth each way, or five-eighths of the given diameter. The interval from the lower deck to the heel is divided into two quarters, and the ſame dimenſions ſet off as at the firſt and ſecond quarters above; laſtly, the heel is thirty-one inches and three-quarters, or ſix-ſevenths of the given diameter.

Thus a curve paſſing through thoſe ſeveral diameters would give the ſhape of the maſt; and ſuppoſing it a ſingle tree, it would only be made circular to thoſe diameters. But large maſts now, as before obſerved, are made of various ſmaller trees, united ſtrongly together by douels, &c. and conſiſt of a ſpindle, ſide-trees, fiſhes, &c. The ſpindle is made of one or two trees, douelled and bolted together. (See *Plate of Maſts*.) Its length is five-ſevenths the given length of of the maſt; its breadth or ſiding two-thirds of the given diameters of the maſt, if the trees deſigned will admit, if not three-fifths, and ſo continued to the hance of the ſide-fiſhes, which is at the middle of the hounds, and above that to the ſize of the maſt at the head. The thwart-ſhip ſize of the ſpindle tapers from a middle line to half the diameter at the ſtop of the hounds, and is to hance in about three inches on each ſide, four feet below the butt of the ſide-trees, and from thence line ſtraight to half the diameters of the maſt at the ſecond quarter, and tapers to half the ſize of the ſtop at the butt, and above the butt of the ſide-trees, the upper part tapers to one-ſixth of the diameter at the head.

Side-trees.—Each ſide-tree is made of a ſingle-tree, or two trees douelled and bolted together: they are ſided to the ſize of the ſpindle the fore and aft-way. Their breadth athwart-ſhips, from the heel of the maſt to the butt of the ſpindle, is one-half the diameter of the maſt, and continues the ſame to the ſecond quarter, deducting the ſubſtance of the ſpindle. At the third-quarter ſpindle included, the breadth is three-ſevenths of the given diameter, and at the hance one-fourth of the breadth of the ſpindle at the ſtop of the hounds. Sometimes ſide-trees are aſſiſted in their length by working heel-pieces, ſcarfed underneath at their lower ends. The ſcarfs of the heel-pieces ſhould be one-half, or not leſs than one-third of their length. The ſide-trees are douelled and bolted to the ſpindle. The maſt, thus far completed, is hewn ſquare to its ſeveral diameters before-mentioned, and then eight-ſquared the thwart-ſhip way.

The *Side-fiſhes* are ſawn from one tree cut down the middle, and one-fourth the diameter of the maſt ſet off on each ſide for their thickneſs. The breadth of the fiſhes is two-thirds the diameter at the partners, and forty forty-one parts of that breadth at the firſt quarter, eleven-twelfths at the ſecond, five-ſixths at the third, and two-thirds at the upper end, and a parallel breadth from the partners to the heel, they are douelled, and faſtened with dumps to the ſide-trees and ſpindle. All the ſurfaces being firſt well payed with tar, they are ſet cloſe together.

When the ſpindle, ſide-trees, and ſide-fiſhes are douelled and bolted together, which is eaſier comprehended by frequently referring to the *Plate of Maſts*, it is hewn ſquare to its ſeveral diameters the fore and aft-way, then eight-ſquared, and any deficiencies in the angles made good by cant-pieces fayed therein; it is then ſixteen-ſquared, and rounded and planed ſmooth from the heel to the hounds, except the ſurface left for douelling on the cheeks, where it is flattened for one-third their length. The maſt, completed thus far, is hooped with iron, as ſhewn in the Plate.

The iron hoops are four inches and a half broad, and five-eighths of an inch thick, and the inner edges chamfered to prevent their bruiſing the maſt.

Maſts thus far finiſhed are ſo ſent to foreign ports, and hence called tranſportation maſts.

Maſts of a leſſer ſize may be conſtructed of two trees, called the upper and lower tree, douelled together in the middle, and bolted: theſe trees give the diameter, fore and aft, and the upper part, for the reception of the cheeks, is formed as the one above; then, with the addition of the ſide-fiſhes, this maſt may be ſo far completed as the former. Then to complete the maſt, the

Cheeks muſt be added: they faſhion the head of the maſt, and leave a ſtop for the ſupport of the treſtle-trees. The length of the cheeks for a main-maſt is nine-twentieths of the whole length of the maſt; for the fore-maſt three-ſevenths, and for a mizen-maſt two-fifths. The length for the head and hounds is agreeable to that firſt mentioned for the maſt. The breadth of the cheeks at the head is two-thirds of the given diameter of the maſt, and three-fourths at the ſtop; and the lower part of the hounds, in the middle between the hounds and lower end, eleven-twelfths of the breadth at the hounds, and at the lower end one-half of the given diameter. The thickneſs of the cheeks is ſet off from the inſide; thus the upper part above the ſtop to be one-fourth of the given diameter, and a ſtop left at the upper part of the hounds to project full half that thickneſs; the lower part of the hounds to be one inch more than the thickneſs at the upper part of the head, and from thence to line ſtraight to five-ninths of the head at the lower end.

The cheeks are each made of a ſingle tree, or two trees douelled together at the middle, and bolted; the inſide of the cheeks is next fayed to the upper part of the ſpindle, to which they are douelled and bolted, and further ſecured by iron hoops; the upper hoop to be its breadth below the under ſide of the cap, another juſt clear of the treſtle-trees, and four more equally between; and another hoop its breadth below the ſtop. Two bolts are to be driven under every hoop, ſix bolts in the hounds, and four more below; and the lower parts of the cheeks to be faſtened with dumps and nails.

On the fore-ſide of the maſt next below the cheek at the heel of the top-maſt is a front fiſh fayed and faſtened to the maſt. (See the ſections in the plate.) The whole is then ſtrongly woolded together with twelve or thirteen turns of rope between every hoop. And to make a fair ſurface, filings of fir are fayed under the wooldings next the edges of the front fiſh.

The *Treſtle-trees* for ſuſtaining the top, and confining the heel of the top-maſt, are made of oak, in length one-fourth the length of their reſpective top-maſt, deep half the given diameter of the lower-maſt, and in thickneſs two-thirds of the depth, fayed and bolted to the lower part of the maſt head, reſting on the ſtop, as ſhewn in the plate.

The *Croſs-trees* are oak, in length one-third the length of the top-maſt deducting ſix inches, breadth what the treſtle-trees are thick, and their depth two-thirds their breadth; the under ſides are tapered from the ends one-fourth their length, and are framed together at right angles, as ſhewn in the plate.

Bibs or *Brackets* are made of elm, three to five inches in thickneſs; in length five-ſixths the length of the hounds; and in breadth two-fifths of their length, fayed and bolted to the maſt, under the treſtle-trees for their ſupport, as in the plate.

Bolſters are pieces of fir fayed on the treſtle-trees, and againſt the ſides of the maſt, between the fid-hole and after-croſs-tree, to project the treſtle-trees one inch and a half, and the ſame in depth. The outer-ſides are rounded for the ſhrouds to lay eaſy thereon.

The *Cap* is made of elm, in one or two pieces, douelled together in the middle: the length of the main-cap is four times the diameter of its top-maſt, and three inches more; the breadth is half the length, and the depth half the breadth. Fore and mizen-caps are the ſame of their reſpective top-maſts, adding two inches to the fore, and one inch only to the mizen. The cap is fixed on the maſt-head by a ſquare tenon; the mortiſe or ſquare hole in the cap is made rather leſs than the tenon, to allow for its ſhrinking. Four eye-bolts are driven through the cap from the under-ſide, and well clenched on plates of one inch and three-quarters diameter, or leſs in proportion to the ſize of the cap, one on each ſide the ſquare hole, and the other by the ſide of the round hole which is before the ſquare hole, two-fifths of the diameter of the round hold, and half the tapering of the maſt-head

head in its length. The ſize of the hole is the given diameter of its top-maſt, and three-quarters of an inch more, as it is lined with leather.

Laſtly, a tenon is made at the heel of the maſt, by which it is fixed in the ſtep: its ſize fore and aft is one-half the given diameter, and athwart-ſhips two-thirds, and of ſufficient depth, as in the plate.

Maſts made of ſingle trees are finiſhed in a ſimilar manner, but having no cheeks the ſtop for the reſt of the treſſle-tree is made by the bibs or brackets. Merchant ſhips' maſts are ſeldom woolded, but hooped only.

Top-maſts have their ſeveral ſizes or diameters ſet equally from a ſtraight line along the middle of their length, which is for the 74-gun ſhips 66 feet. From the butt end ſet up once and a half the diameter, which is 20 inches, for the block below the heeling, and twice and a half the diameters above that for the heeling; and from the lower part of the ſaid heeling, the length of the lower maſt-head, or place of the cap, where the given diameter, 20 inches, is ſet off. Then from the whole length ſet back five inches for every yard in the length, for the length of the head and ſtop of the hounds, for main and fore-top-maſt, and four inches for mizen-top-maſts, and three-fifths that length below it for the hounds: then divide from the lower part of the head to the cap into four quarters; that next the cap is the firſt quarter; then ſet off, as before, 19 inches and five-eighths, or ſixty ſixty-ones of its given diameter; at the ſecond quarter, 18 inches and five-eighths, or fourteen-fifteenths; at the third quarter, 17 inches and one-eighth, or ſix-ſevenths; at the lower part of the hounds, 16 inches and one-quarter, or thirteen-ſixteenths; at the ſtop, 18 inches, or nine-tenths; at the lower part of the head, 14 inches ſquare, or ſeven-tenths; and at the upper part, 11 inches ſquare, or five-ninths.

The aft-ſides of top-maſts are lined ſtraight, the heeling to be ſquare, and large enough, if the tree will admit, to fill up the treſtle-trees at the lower maſt-head, and to hance from the upper part to the diameter of the cap, and to be eight-ſquare, or nearly ſo. The block below the heeling to be eight-ſquare, and of the ſame ſize as the diameter at the cap, with an iron hoop driven on the heel. The ſtop above the hounds on the fore and after-ſides to come up to the under-ſides of the croſs-trees; the hounds are left eight-ſquare, and all below the hounds to the under-ſide of the main-cap is to be ſmoothly rounded. Sheave-holes for the top-rope are mortiſed through, one in the heeling, and one in the block below it; their length rather more than the depth, and their thickneſs two inches for every foot in length. A groove to bury the top-rope is made in each angle, in the direction of the lower ſheave-hole.

The fid-hole is a ſquare mortiſe, cut through the middle of the heeling the ſize of the fid, which is in length once and a half the given diameter of the lower-maſt, its depth one-third the given diameter of the top-maſt, and its thickneſs two-thirds its depth, made of iron; but when made of wood, the depth is half the given diameter of its top-maſt. A hole is made through one end for a laniard, and the other is ſhaped.

Top-maſt treſtle-trees: their length is three inches and a half to every yard in the length of their top-maſt, in depth one inch and one-eighth to every foot in their length, and two-thirds their depth in thickneſs. Each croſs-tree is one-third longer than the treſtle-tree, their depth ſeven-eighths the depth of the treſtle-tree, and are framed and bolted together as in the plate; with a ſheave-hole mortiſed through the fore-end of the main, and two ſheave-holes in each end of the fore-top-maſt treſtle-trees.

The top-maſt cap is ſo ſimilar to its topmaſt as the lower cap to its reſpective maſt, that it needs only a reference to the plate.

Mizen-top-maſts differ but little from the former: they have no block, but the heeling is ſet up from the butt, and, inſtead of a ſquare head, have a long pole head about four times the length of the ſquare head. They have a ſheave-hole mortiſed through the hounds, fore and aft, for the top-ſail-tye; and one a little above the ſtop, for the ſtay-ſail-haliards; and one a little below the truck, for the mizen-top-gallant-tye.

Top-gallant-maſts are made ſimilar to mizen-top-maſts: if to carry royal maſts, the heads are ſquare like a main-top-maſt, but moſtly made with pole-heads; if a ſtump pole-head, the ſame as a ſquare head; if a common pole-head, its length is two-fifths the given length; and if a long pole-head, it is two-thirds the given length.

Royal maſts are made ſimilar to ſtump-head top-gallant-maſts.

Bowſprits are rarely made of one tree, but are made of many, ſimilar to made-maſts: if made of two trees, they are ſided to two-thirds the diameter of the bowſprit the thwart-ſhip way, and each tree is one-half the diameter fore and aft, and douelled together in the middle, and bolted, and the deficiency made good athwart-ſhips by ſide-fiſhes; conſequently each ſide-fiſh muſt be in thickneſs one-fourth the diameter, and are douelled and bolted to the ſides, as may be readily ſeen in the maſt-plate. Bowſprits made of ſingle trees have a line ſtraight along the middle, upon which ſet up the length from the butt, which is 68 for a 74-gun ſhip; next ſet off the bed, which is three-tenths of the length ſet up from the butt, and ſix inches added. Set back from the length four inches for every yard in the given length for the long ſquare on the upper ſide, and one-third that for the ſhort ſquare on the under ſide; then from the bed to the outer end divide it equally into four parts, and that next the bed is the firſt quarter, and ſo on. At the bed ſet off equally from the middle line the given diameter, which is 35 inches; and at the firſt quarter, 34 inches and one-quarter, or ſixty ſixty-ones of the given diameter; at the ſecond quarter, 32 inches and one-eighth, or eleven-twelfths; at the third quarter, 28 inches or four-fifths; at the outer end, 19 inches and a half, or five-ninths; and at the heel, 30 inches or ſix-ſevenths. It is then lined to theſe diameters with a fair curve, and ſawn ſquare, then eight-ſquared, next ſixteen-ſquared, and, laſtly, rounded from the heel to the ſquare at the outer end. At the heel is a tenon three-fifths the given diameter athwart-ſhips, and two-thirds up and down, tapering one inch in the length, which is one-third the given diameter.

The bowſprit-cap is made of elm, in length five diameters of the jib-boom, the breadth twice the diameter of the jib-boom, and half the diameter of the jack-ſtaff, and the thickneſs four-ninths the breadth. In the lower part of the cap is a mortiſe to fix on the tenon at the outer end of the bowſprit, and a hole at two-ſevenths the diameter of the bowſprit above it, for the jib-boom to ſlide through, leaving half the diameter of the jack-ſtaff on the ſtarboard ſide, where a groove is made to receive the ſame: bolts are then driven through the cap, as in the plate.

Bees are made of elm, about four inches thick, in breadth three-fifths of the given diameter of the bowſprit, and in length from the aft-ſide of the cap to the aft-part of the long ſquare. They are let in, one on each ſide, one-third their thickneſs, into the bowſprit; their upper ſides are kept fluſh with the upper ſide of the bowſprit, and the outer edges raiſed above the level three inches to every foot in breadth.

breadth, and are bolted through the bowfprit with four bolts. A block is fitted with a fheave-hole in each end, under each bee, as in the plate.

Saddles are pieces of elm faftened on the upper fide of the bowfprit: that for the jib-boom is half the given diameter in length, and one-fixth in thicknefs, fixed at one-third the length of the jib-boom within the outer end. Saddles for the fprit-fail-flings are one-eighth the given diameter in thicknefs, and nails on the bowfprit at one-fifth the length within the outer end. A faddle to lead in the running-rigging is fimilar to the latter, having holes the fize of the ropes bored through it, and nails on the bowfprit juft before the gammoning.

Bowfprits of fmall veffels have an iron hoop with an eye on each fide, and one on the upper fide; it is let on and faftened at the outer end. A fheave-hole is cut through at the heel, and one at the outer end.

The *Jib-boom* is prolonged from the bowfprit, has a ftraight line ftruck along the middle of its length, which is 50 feet 6 inches for a 74-gun fhip: one-third of that length is fet up from the butt, and at that place fet off 14 inches and a half, the given diameter; and from thence to the outward end divide into four equal parts, and at the firft quarter fet off 14 inches and one-eighth, or forty forty-ones of the given diameter; at the fecond quarter, 13 inches and one-quarter, or eleven-twelfths; at the third quarter, 12 inches and one-eighth, or five-fixths; and at the outer end, nine inches and three quarters, or two-thirds the given diameter. It is firft fquared to thofe diameters, then eight-fquared: then fet up from the heel three times and a half the given diameter, and from thence it is to be round to the outer end. Make a ftop at once and a half the diameter within the outer end, and cut a fheave-hole through from the upper fide half its length within the ftop, and another fheave-hole at once and a half the diameter from the heel, and through the middle of the ftarboard fquare, and a hole bored through between that and the heel, as in the plate.

Mafts of wrought-iron have lately been propofed thus: the cylinder to be half an inch thick, and the fame height and diameter as the fir maft, will not be fo heavy, will be confiderably ftronger, much more durable, lefs liable to be injured by fhot, and be eafily repaired even at fea. It will weigh only 12 tons, and, at 45*l.* *per* ton, will not coft more than 540*l.*; while its ftrength will be nearly 50 *per cent.* above that of a fir maft, that weighs 23 tons, and cofts nearly 1200*l.* This maft is made to ftrike nearly as low as the deck, to eafe the fhip in a heavy fea. Ships furnifhed with fir mafts are, in fuch circumftances, obliged to cut them away. Ships furnifhed with iron mafts will not, like others, be expofed to the rifk of receiving damage from lightning; the iron maft of itfelf being an excellent conductor. By ufing an iron bolt from the heel of the maft, through the keelfon and keel, the electric matter will be conducted through the bottom of the fhip into the water, without injury to the fhip. Bowfprits and yards may alfo be made of wrought-iron, at the fame proportion of ftrength and expence as the maft.

Mafts and yards, particularly the latter, by a patent of Mr. Smart's, were propofed to be made hollow, of wood fomewhat fimilar to the ftaves of a cafk.

Gordon, in his Naval Architecture, has recommended mafts to be made in a curious manner of feveral fmall trees to be united together by a fort of brackets at certain diftances. The former have been actually tried, but their not coming more into practice feems to make againft their utility.

Dimenfions of Mafts, Yards, &c. for the Plates of a 74-Gun Ship, Frigate of 40 Guns, and Eaft-India Ship of 1300 Tons. See SHIP-BUILDING.

Names of the Mafts and Yards, &c.	74-Gun Ship.				Frigate of 40 Guns.				Eaft-India Ship.			
	Mafts.		Yards.		Mafts.		Yards.		Mafts.		Yards.	
	Length.	Diam.	Length.	Diam.	Length.	Diam.	Length.	Diam.	Length.	Diam.	Length.	Diam.
	Ft. In.	Inches.	Ft. In.	Inches.	Ft. In.	Inches.	Ft. In.	Inches.	Ft. In.	Inches.	Ft. In.	Inches.
Main - - -	111 0	37	97 0	24	93 0	28	82 0	20	96 0	31½	86 0	21
Main-top - - -	66 0	20	70 0	16	55 0	16½	60 0	13	56 0	17½	58 0	14
Main-top-gallant - -	33 0	11½	46 6	10	27 6	9¼	37 6	8	27 0	9	35 0	8½
Main-top-gallant-royal -			35 0	7¾			29 0	6¼	20 0	6½	24 0	5
Fore - - -	98 6	34	85 0	21	83 0	25	72 0	17	90 0	30	82 0	20
Fore-top - - -	58 8	20	62 0	14	49 0	16½	54 0	12	56 0	17½	50 0	13½
Fore-top-gallant - -	29 4	10	40 6	8½	25 0	8¼	33 0	7	26 0	9	36 0	8
Fore-top-gallant-royal -			31 0	6¾			26 0	6	18 0	6	22 0	5
Mizen - - -	95 0	23	84 0	16	77 0	19	39 0	11¼	78 0	21½	72 0	13
Mizen-top - - -	49 0	14	47 0	9¾	42 0	11¾	40 6	8½	41 0	13	40 0	9½
Mizen-top-gallant - -	24 6	8½	31 6	6⅜	21 0	7	28 0	5½	21 0	7	25 0	5½
Mizen-top-gallant-royal -			23 0	5			20 0	4¼	12 0	5	16 0	4½
Bowfprit - - -	68 0	35	62 0	14	56 0	28	53 6	11¼	60 0	31	56 0	11½
Jib-boom - - -	50 6	14½	40 6	8½	39 0	1[illegible]	33 0	6¼	44 0	12½	38 0	8
Driver-boom - -					60 0	12	33 0	6¼	62 0	12		
Crofs-jack - - -			62 0	13			53 6	11¼			56 0	11½
Lower-ftudding-boom -	53 9	10¾	31 0	6¼	45 0	9	26 0	5¼	44 0	9	30 0	7
Main-top-boom - -	48 6	9¾	27 3	5½	41 0	8¼	23 6	4¼	43 0	8½	24 0	6
Main-top-gallant-boom -	35 0	7	20 0	4	29 6	6	17 0	3½	29 0	6	18 0	5
Fore-top-boom - -	42 6	8½	24 6	5¼	36 0	7¼	21 0	4¾	41 0	8½	24 0	6
Fore-top-gallant-boom -	31 0	6¼	17 9	3¾	26 6	5¼	15 0	3	27 0	6	17 0	5
Enfign-ftaff - -	40 0	6½			35 0	5¾			40 0	7		
Jack-ftaff - - -	18 0	4½			16 0	3¾			26 0	5½		

A Fractional

A Fractional Table of the Proportion that every Part of a Maſt, Yard, &c. bears towards the given Diameter, as in the preceding Table.

	Quarters. 1ſt.	2d.	3d.	Head. Low. part.	Upper part.	Heel.
Lower-maſts that are cheeked — fore and aft				$\frac{3}{4}$	$\frac{5}{6}$	
	$\frac{60}{61}$	$\frac{15}{16}$	$\frac{7}{8}$			$\frac{6}{7}$
Lower-maſts that are cheeked — athwart ſhips				$\frac{7}{8}$	$\frac{5}{8}$	
Lower-maſts that head themſelves	$\frac{60}{61}$	$\frac{14}{15}$	$\frac{5}{7}$	$\frac{3}{4}$	$\frac{5}{8}$	$\frac{5}{7}$
Top-maſts, gallant-maſts, and royal-maſts	$\frac{60}{61}$	$\frac{14}{15}$	$\frac{6}{7}$	$\frac{7}{10}$	$\frac{5}{9}$	
Bowſprit	$\frac{60}{61}$	$\frac{11}{12}$	$\frac{4}{5}$	$\frac{5}{9}$ outer end.		$\frac{6}{7}$
Heeling of lower-maſts	$\frac{2}{3}$ athwart ſhips.			$\frac{1}{2}$ fore and aft.		
Heeling of bowſprits	[illegible] athwart ſhips.			$\frac{2}{3}$ up and down.		
Yards in general, at the quarters	$\frac{30}{31}$	$\frac{7}{8}$	$\frac{7}{10}$	[illegible] arms.		
Mizen-yard — lower-arm ditto	$\frac{60}{61}$	$\frac{11}{12}$	$\frac{1}{2}$	$\frac{2}{3}$ arms.		
Mizen-yard — upper-arm ditto	$\frac{30}{31}$	$\frac{7}{8}$	$\frac{7}{10}$	$\frac{2}{3}$ arms.		
Gaffs	$\frac{40}{41}$	$\frac{11}{12}$	$\frac{4}{5}$		$\frac{5}{6}$ ends.	
Driver-booms and jib-booms	$\frac{40}{41}$	$\frac{11}{12}$	$\frac{5}{6}$		$\frac{2}{3}$ ends.	
Main-booms	$\frac{40}{41}$	$\frac{11}{12}$	$\frac{7}{8}$	$\frac{2}{3}$ fore and aft. $\frac{3}{4}$ do		$\frac{3}{4}$

By the above tables of lengths and diameters of maſts, yards, &c. may be eaſily aſcertained the relative lengths they bear to each other, and their diameter in inches to their reſpective yards in length.

The length of the main-maſt, in moſt ſhips, is governed by the length and breadth of the ſhip. Thus: let the length at the load-water line from the rabbit of the ſtern to the rabbit of the ſtern-poſt be added to the extreme breadth, and half that ſum is the length of the main-maſt. But for very ſharp-bodied ſhips take ſeventeen-twentieths of the above ſum for the length of the main-maſt. Then for the length of the fore-maſt take nine-tenths of the main-maſt, and in ſome ſhips full that. For the bow-ſprit take three-fifths of the main-maſt, and in ſome ſhips more, and ſo on of the others, as may be ſeen by inſpecting the table.

Mast, *Armed*, one that is made of more than one tree.

Mast *Carlings*, are large ſquare pieces of oak timber placed into the beams at the ſides of the maſt rooms, for the purpoſe of framing the partners.

Mast, *Heel of a*. See Heel.

Mast, *Jury*. See Jury.

Mast *Rooms*, the ſpaces between thoſe beams where the maſts are fixed.

Mast, *Spending a*, at *Sea*, is when it is broke by foul weather.

Mast, *Springing a*, is when it is cracked in any place.

Mast *Bay*, in *Geography*, a bay on the N. ſide of the iſland of Jamaica; E. of Montego bay and near Catlin's cliffs.

Mast *Iſland*, a ſmall iſland in the Indian ſea, near the coaſt of Africa. S. lat. 11° 28′.

Masts, in *Rural Economy*, a provincial term applied to acorns in ſome diſtricts, but improperly. It is ſometimes pronounced *meſs*.

MASTA, in *Geography*, a ſmall iſland in the Adriatic. N. lat. 44° 7′. E. long. 15° 23′.

MASTAI, a town of Japan, on the S. coaſt of Niphon; 10 miles S.W. of Meaco. N. lat. 34° 46′. E. long. 134° 30′.

MASTASA, a town of Fez; 40 miles W.N.W. of Velez de Gomera.

MASTASSIN Lake, a lake of North America, at the head of Rupert's river, which falls into James's bay; it is about 200 miles in circuit, and interſected by projections of land.

MASTED. A ſhip is ſaid to be maſted, when ſhe has all her maſts complete.

Masted, *Over*, or *Tautn-maſted*, is ſaid of a ſhip whoſe maſts are either too long or too big; which makes her lie too much down by the wind, and labour too much *a-hull*.

Masted, *Under*, or low-maſted ſhips, ſuch whoſe maſts are either too ſmall, or too ſhort; in which caſe ſhe cannot bear ſo great a ſail as ſhould give her true way.

MASTER, a title given to ſeveral officers and perſons of authority and command; particularly to the chiefs of the orders of knighthood, &c.

Thus we ſay, the grand-maſter of Malta; of St. Lazarus; of the Golden Fleece; of the Free Maſons, &c.

Master, *Magiſter*, was a title frequent among the Romans; they had their maſter of the people, *magiſter populi*, who was the dictator. Maſter of the cavalry, *magiſter equitum*, who held the ſecond poſt in an army, after the dictator. Under the later emperors there were alſo maſters of the infantry, *magiſtri peditum*. A maſter of the cenſus, *magiſter cenſus*, who had nothing of the charge of a cenſor, or ſubcenſor, as the names ſeem to intimate; but was the ſame with the *præpoſitus frumentariorum*.

Master *of the Militia*, *magiſter militiæ*, was an officer in the lower empire, created, as it is ſaid, by Diocleſian, who had the inſpection and government of all the forces, with power to puniſh, &c. ſomewhat like a conſtable of France.

At firſt there were two of theſe officers inſtituted, the one for the infantry, and the other for the cavalry; but the two were united into one under Conſtantine. Afterwards, as their power was increaſed, ſo was their number alſo; and there was one appointed for the court, another for Thrace, another for the Eaſt, and another for Illyria. They were afterwards called *comites*, *counts*, and *clariſſimi*. Their power was only a branch of that of the *præfectus prætorii*, who by that means became a civil officer.

Master *of Arms*, *magiſter armorum*, was an officer, or comptroller under the maſter of the militia.

Master *of the Offices*, *magiſter officiorum*, had the ſuperintendance of all the officers of the court; he was alſo called *magiſter officii palatini*; ſimply *magiſter*; and his poſt *magiſteria*.

This officer was the ſame in the weſtern empire, with the curopalates in the eaſtern.

Master, in the Roman hiſtory and laws, is uſed for every officer who is the chief of his kind; and has others of the ſame ſpecies, or that have the ſame functions, under him. In Latin, *magiſter*, and oftentimes *proximus*, or *primicerius*.

Master *of the Armory*, is an officer who has the care and overſight of his majeſty's arms and armory.

Master *at Arms*, is an officer appointed to teach the officers

officers and crew of a ship of war the exercise of small arms; to confine and plant centinels over the prisoners, and superintend whatever relates to them during their confinement. He is also to observe that the fire and lights are all extinguished as soon as the evening-gun is fired, except those which are permitted by proper authority, or under the inspection of the centinels. It is likewise his duty to attend the gangway, when any boats arrive aboard, and search them carefully, together with their rowers, that no spirituous liquor may be conveyed into the ship, unless by permission of the commanding officer. In these several duties he is assisted by proper attendants, called his corporals, who also relieve the centinels, and one another, at certain periods. Falconer.

Master *of Arts*, the first degree taken up in foreign universities, but the second in ours; candidates not being admitted to it till they have studied in the university seven years. See Degree.

Master-*Attendant*, is an officer in the royal dock-yards, appointed to hasten, and assist at, the fitting out or dismantling, removing, or securing vessels of war, &c. at the port where he resides. He is particularly to observe that his majesty's ships are securely moored, and for this purpose he is expected frequently to review the moorings, which are sunk in the harbour, and observe that they are kept in proper repair. It is also his duty to visit all the ships in ordinary, and see that they are frequently cleaned and kept in order; and to attend at the general musters in the dock-yards, taking care that all the officers, artificers, and labourers, registered at the navy-books, are present at their duty. Falconer.

Master, *Barrack*. See Barrack.

Master *of the Ceremonies*, an officer instituted by king James I. for the more solemn and honourable reception of ambassadors, and strangers of quality, whom he introduces into the presence.

The badge of this office is a gold chain and medal, having on one side an emblem of peace, with king James's motto; and on the reverse the emblem of war, with *Dieu & mon droit*. He is always supposed to be a person of good address, and master of languages, and has an appointment of 300*l*. a-year: he is constantly attending at court, and hath under him an assistant master or deputy, at 6*s*. 8*d*. a day; who holds his place during the king's pleasure.

There is also a third officer, called *marshal of the ceremonies*, with 100*l*. a-year, whose business is to receive and distribute the master's orders, or the deputy's, for the service: but, without their order, he can do nothing. This is the king's gift.

Masters *of Chancery* are usually chosen out of the barristers of the common law; and sit in chancery, or at the rolls, as assistants to the lord chancellor, and master of the rolls. All these, so late as the reign of queen Elizabeth, were commonly doctors of the civil law.

To them are also committed interlocutory reports, examination of bills in chancery, stating of accounts, taxing costs, &c. and sometimes, by way of reference, they are empowered to make a final determination of causes.

They have, time out of mind, had the honour to sit in the lords' house, though they have neither writs, nor patent to empower them; but they are received as assistants to the lord chancellor, and master of the rolls. They had anciently the care of inspecting all writs of summons, which is now performed by the clerk of the petty-bag. When any message is sent from the lords to the commons, it is carried by the masters of chancery. Before them also affidavits are made, and deeds and recognizances acknowledged. See Chancellor and Court *of Chancery*.

Besides these, who may be called masters of chancery *ordinary* (being twelve in number, whereof the master of the rolls is reputed the chief), there are also masters of chancery *extraordinary*, appointed to act in the several counties of England beyond ten miles distance from London, by taking affidavits, recognizances, &c. for the ease of the suitors of the court.

Master *of the Faculties*, an officer under the archbishop of Canterbury, who grants licenses and dispensations: he is mentioned in the statute 22 & 23 Car. II. See Court *of Faculties*.

Master-*Gunner of England*. See Gunner.

Master *of the Horse*, a great officer of the crown, to whom is committed the charge of ordering and disposing all matters relating to the king's stables, races, and breed of horses, with a salary of 1266*l*. 13*s*. 4*d*. a-year.

He hath a power of commanding the equerries, and all the other officers and tradesmen employed in the king's stables; to all which he gives by his warrant to the avenor, the oath of allegiance, &c. for the faithful discharge of their duty. He has the peculiar privilege of making use of any horses, pages, or footmen, belonging to the king's stables; so that his coaches, horses, and attendants are the king's, and have the king's arms and liveries.

There is also a master of the horse in the establishment of her majesty's houshold, with a salary of 800*l*. a-year.

Master *of the Houshold* is an officer under the lord steward of the houshold, in the king's gift; his business is to survey the accounts of the houshold. His salary is 500*l*. a-year.

Anciently the lord steward himself was called *grand-master of the houshold*.

Master *of the Jewel Office*, is an officer of the king's houshold, who has the charge of the gold and silver plate used at the king's table, or at that of any officer attending the court, and of all plate remaining in the Tower of London; as also of chains and loose jewels not fixed to any garment. See Jewel-*Office*.

Master *of the Mint*, was anciently the title of him who is now called *warden of the mint*; whose office is to receive the silver and bullion which comes to the mint to be coined, and to take care thereof.

The office of master and worker is now distinct; and this officer is allowed for himself 3000*l*. a-year, and for three clerks 205*l*. each. There is also the king's assay-master, allowed for himself and clerk 425*l*. a-year: and the master's assay-master, with a salary for himself and foreman of 125*l*. a-year.

Master *of the Ordnance*. See Ordnance.

Master *of the Revels*, an officer with an appointment of 100*l*. a-year, whose business is to order all things relating to the performance of plays, masques, balls, &c. at court. Formerly he had also a jurisdiction of granting licences to all who travel to act plays, puppet-shows, or the like diversions; neither could any new play be acted at either of the two houses till they had passed his perusal and licence; but these powers were afterwards much abridged, not to say annihilated, by a statute for regulating playhouses, till the licensing plays by the lord chamberlain was established. This officer was a yeoman, with 46*l*. 11*s*. 8*d*. *per annum*.

Master *of the Robes*. See Robes.

Master *of the Rolls*, a patent officer for life; who has the custody of the rolls and patents which pass the great seal; and of the records of the chancery.

In the absence of the lord chancellor, or keeper, he also sits as judge in the court of chancery; and is, by sir Edward Coke, called *his assistant*.

At other times he hears causes in the rolls-chapel, and makes orders and decrees. He is also the first of the masters of of chancery, and hath their affiftance at the rolls: but all hearings before him are appealable to the lord chancellor.

He hath alfo his writ of fummons to parliament, and fits next to the lord chief juftice of England, on the fecond wool-pack: he hath the keeping of the parliament-rolls, and has the rolls-houfe for his habitation; as alfo the cuftody of all charters, patents, commiffions, deeds, and recognizances, which being made of rolls of parchment, gave rife to the name. Anciently he was called *clerk of the rolls*.

Concerning the authority of the mafter of the rolls to hear and determine caufes, and his general power in the court of chancery, there were (not many years fince) divers queftions and difputes very warmly agitated; to quiet which, it was declared by ftat. 3 Geo. II. cap. 30. that all orders and decrees by him made, except fuch as by the courfe of the court were appropriated to the great feal alone, fhould be deemed to be valid; fubject neverthelefs to be difcharged or altered by the lord chancellor, and fo as they fhall not be inrolled, till the fame are figned by his lordfhip. Blackft. Com. vol. iii.

In his gift are the fix clerks in chancery, the examiners, three clerks of the petty-bag, and the fix clerks of the rolls-chapel, where the rolls are kept. See ROLLS, CLERK, &c.

MASTER *of a Ship*, an officer to whom is committed the direction of a merchant veffel, who commands it in chief, and is charged with the merchandizes abroad.

In the Mediterranean the mafter is frequently called *patron*, and in long voyages *captain*.

It is the proprietor of the veffel that appoints the mafter, and it is the mafter who provides the equipage, hires the pilots, failors, &c. The mafter is obliged to keep a regifter of the feamen and officers, the terms of their contract, the receipts and payments, and, in general, of every thing relating to his commiffion.

MASTER *of a Ship of War*, is an officer appointed by the commiffioners of the navy, to take charge of navigating a fhip from port to port, under the direction of the captain. The management and difpofition of the fails, the working of a fhip into her ftation in the order of battle, and the direction of her movements in the time of action, and in other circumftances of danger, are alfo more particularly under his infpection. It is likewife his duty to examine the provifions, and accordingly to admit none into the fhip but fuch as are found fweet, and wholefome. He is moreover charged with the ftowage; and for the performance of thefe fervices, he is allowed feveral affiftants, who are properly termed *mates* and *quarter-mafters*.

MASTER *of the Temple*. The founder of the order of the Templars, and all his fucceffors, were called *magni templi magiftri;* and ever fince the diffolution of the order, the fpiritual guide and director of the houfe is called by that name. See TEMPLE and TEMPLAR.

MASTER *or Keeper of the Wardrobe*, an officer in the lord chamberlain's department, who has the direction of all the royal robes, as thofe of the coronation, St. George's feaft, and the parliament-robes; as well as of the wearing apparel, collar of SS's, George and Garter, &c.

He has alfo the charge and cuftody of all former kings' and queens' robes, remaining in the Tower; all hangings, bedding, &c. for the king's houfe; and the charge and delivery of velvet and fcarlet allowed for liveries.

He has under him a groom and two clerks, a yeoman, &c. See WARDROBE.

There are alfo feveral other officers under this denomination, as the mafter and conductor of the band of mufic, whofe falary is 300*l.* a-year; mafter of mechanics, with a falary of 200*l.* a-year; mafter of the tennis-court, with a falary of 132*l.* a-year; mafter of the barges, with 100*l.* a-year; mafter of the harriers, with 2000*l.* a-year; mafter of the buck-hounds, with 2341*l.* a-year; mafter of the ftag-hounds, with 2000*l.* a-year; mafter-falconer, with 210*l.* a-year, &c.

MASTER, *Burgher*. See BURGHER.

MASTERS, *Burgher*. See BURGHERMASTERS.

MASTER, *Fire*. See FIRE.

MASTER, *Quarter*. See QUARTER.

MASTER-*arch*. See ARCH.

MASTER *Load*, in *Mining*, a term ufed to exprefs the larger vein of a metal, in places where there are feveral veins in the fame hill. See LODE.

MASTER-*piece*, an exquifite, or extraordinary work, or performance, in any art or fcience.

MASTER-*piece*, *chef d'œuvre*, is particularly ufed among the French, for a work which thofe who afpire to be admitted mafter of any art or trade, are to perform in prefence of the mafters, or jurands, of that company, by way of a fpecimen of their capacity.

MASTER-*vault*. See VAULT.

MASTER-*wort*, in *Botany*. See IMPERATORIA.

MASTER-*wort*, *Black*. See ASTRANTIA.

MASTER-*yaw*, a large yaw, fometimes remaining after falivation. See YAWS.

MASTICA *de Sobo*, in the *Materia Medica*, the name given by the Indians to the ftone commonly known among authors by the name of *pedro del porco*, a fort of bezoar taken out of the gall-bladder of an Indian boar. The Indians, and many of the European nations, efteem this one of the greateft medicines in the world in peftilential difeafes, and the fmall-pox.

MASTICATION, in *Phyfiology*, is the operation of chewing, in which, by the motion of the jaws and teeth, the food is brought into a ftate in which it can be fwallowed. The action of the teeth comminutes the harder kinds of food, and the fluids, poured into the mouth from the falivary glands, by their admixture, foften the food thus comminuted. This procefs, and the inftruments concerned in its performance, are defcribed in the article DEGLUTITION.

MASTICATORIES, MASTICATORIA, in *Medicine*, are fuch remedies as are taken in at the mouth, and chewed in order to promote the evacuation of the falival humour: as tobacco, ginger, pepper, fage, rofemary, thyme, maftich, &c.

MASTICH. See *Calcareous* CEMENT.

MASTICH-*Tree*, *Turpentine-tree*, or *Piftachia-nut-tree*, in *Botany*. See PISTACHIA *Lentifcus*.

MASTICH, in the *Materia Medica*, a refinous fubftance that is obtained from the Piftachia lentifcus, which is a native of the fouth of Europe and the Levant, and which appears by Evelyn's Kalendarium Hortenfe to have been cultivated in Britain in 1666. It is obtained, moft abundantly, according to Tournefort, by making tranfverfe incifions in the bark of the tree about the beginning of Auguft, from which the maftich refin, or gum, exudes in drops, which running down and concreting on the ground, are thence collected for ufe. The time chofen for making thefe incifions is the firft of Auguft, when the weather is very dry: in the following day the maftich begins to appear in drops, which continue to exude till the latter end of September. The tree is raifed alfo in feveral parts of Europe; but no refin has been obferved to iffue from it in thefe climates. It has its name maftich, from *mafticare, to chew*, becaufe it is thus ufed in Scio, and by the Turks, efpecially the women, for fweetening the breath, and ftrengthening the gums and teeth: and by producing a copious excretion

cretion of faliva, it proves ferviceable in catarrhous diforders.

According to Olivier, (Travels in the Ottoman Empire,) maftich is gathered in 21 villages of the ifland of Scio; and the incifions, he fays, are made from the 15th to the 20th of July, according to the Greek calendar. Cloths are frequently placed under the tree, fo that the maftich which trickles from it may not be impregnated with earth and filth. By the regulations made in the ifland, the firft gathering cannot take place before the 27th of Auguft. It lafts eight fucceffive days, after which frefh incifions are made in the trees till the 25th of September, and then the fecond gathering is made, which likewife lafts eight days. After this time the trees are cut no more, but the maftich which continues to run is gathered till the 19th of November on the Monday and Tuefday of every week. It is afterwards forbidden to gather this production. This production in the 21 villages of Scio, amounts, one year with another, to 50,000 okes, and even more. Twenty-one thoufand belong to the aga who farms this commodity, and are delivered by the cultivators in payment of their perfonal impoft. They are paid for the furplus at the rate of 50 parats per oke (nearly 16 fous the pound), and they are prohibited, under very fevere penalties, from felling or difpofing of it to any other than the aga who farms it. That of the beft and fineft quality is fent to Conftantinople, for the palace of the grand fignior. That of the fecond quality is intended for Cairo, and paffes into the harems of the Mamalukes. The merchants generally obtain a mixture of the fecond and third quality.

This refinous fubftance is brought to us in fmall yellowifh tranfparent brittle grains or tears. A piece recently broken is quite tranfparent, but by expofure to the air it becomes fuperficially fomewhat pulverulent, and hence femitranfparent. Its fpecific gravity is 1.074. By digeftion with alcohol it is feparated into two portions; the one foluble in this fluid, and the other infoluble: the former compofes about $\frac{4}{5}$ths of the whole, and is pure refin; the latter in moft of its properties clofely refembles caoutchouc. The prefence of this fubftance in maftich was firft remarked by Kunde, an apothecary of Berlin, whofe obfervations have fince been confirmed by Mr. Matthews. After folution of the refin in alcohol an inflammable refidue is left behind of a white colour, confiderably elaftic and adhefive; when heated it becomes brown, emitting an inflammable gas, and in this ftate greatly refembles common caoutchouc, except in being flightly glutinous. It is perfectly foluble in wafhed fulphuric ether, from which it is precipitable by alcohol in the form of a white curd. It is wholly infoluble in water. By digeftion with nitric acid it is converted into a yellow brittle porous mafs, nitrous gas being at the fame time given out; it is charred by fulphuric acid, to which it communicates a deep (fomewhat muddy) crimfon colour, with the evolution of fulphureous acid. Neither the muriatic nor oxymuriatic acids, nor the alkalies, whether cauftic or carbonated, have any action on it: in all which particulars it agrees with caoutchouc.

It has a light agreeable fmell, efpecially when rubbed or heated. It is almoft totally foluble in fpirit of wine, yielding a folution of a pale yellow colour, but not at all in water. Diftilled with water, it yields a fmall proportion of a limpid effential oil, in fmell very fragrant, and in tafte moderately pungent. Rectified fpirit alfo brings over in diftillation the more volatile odorous matter of the maftich. It becomes foft and tough like wax, by being chewed. Maftich is recommended in dofes from half a fcruple to half a drachm, as a mild corroborant and aftringent, in old coughs, hæmoptyfes, diarrhœas, weaknefs of the ftomach, &c. It is given either in fubftance, divided by other materials; or diffolved in fpirit and mixed with fyrups; or diffolved in water into an emulfion, by the intervention of gum arabic or almonds. It is alfo an ingredient in varnifhes. See Varnish.

The jewellers mix maftich with turpentine and ivory-black, and lay it under their diamonds, to give them a luftre.

The Lentifci lignum, or wood of this tree, is received into the Materia Medica of fome of the foreign pharmacopeias, and is highly extolled in dyfpeptic, gouty, hæmorrhagic, and dyfenteric affections. Lewis. Woodville.

The Arabian writers, Avicenna and Serapion, in their chapters of the turpentine-tree, often mention the lentifk and its refin, which they fay was very much like the refin of the common turpentine-tree. But befides this, Avicenna has a peculiar chapter on maftich; whence it fhould feem, that by the name lentifk they do not mean the tree which produces maftich, but fome peculiar fpecies of the turpentine-tree.

Avicenna diftinguifhes two kinds of maftich, the one called *rumi*, and the other *cupti*: the *rumi* came from the ifland of Scio, and was white; the *cupti* was of a blackifh colour, and brought from Egypt.

Mastich *Herb*, *mafter-thyme*, *marum vulgare*, in *Botany*, a name given to one of the fpecies of *Thymus*; which fee.

It is a plant that grows naturally in Spain, in dry gravelly grounds, and in the like foils bears the ordinary winters of our climate. It flowers in June, and its flowers are fmall, white, and ftanding in hairy briftly empalements: the whole plant has a grateful odour.

This plant is employed chiefly, like the Syrian maftich, as an errhine. It is confiderably pungent, though lefs fo than the other.

Mastich, *Indian*. See Schinus.

A decoction of the bark of this tree makes a fomentation of extraordinary efficacy in pains of the legs, and inflations. Of the fmall branches are made ferviceable toothpicks. Of the fruit boiled in water, according to the meafure of the decoction, they prepare either a wine, a very good fort of drink, vinegar, or honey. A decoction of the leaves gives relief in pains proceeding from cold caufes. Raii Hift. Plant.

Mastich, *Syrian herb*, *marum Syriacum*, is a fpecies of *Teucrium*; which fee.

Mastich, *Syrian herb*, in the *Materia Medica*. See Germander.

MASTICHE Terra, *maftich earth*, a name given by fome of the old writers on the materia medica to the Chio or Scio earth, or *terra Chia*. The reafon of this ftrange appellation feems to have been, that the fineft maftich coming from the ifland of Chio, had obtained the name of *Kio*, or *Chio*, and *maftich* and *Chia* being thus become, in one fenfe, fynonimous words, the ufe of them was, in this manner, carried much farther, and the earth of that ifland called by the name of the *gum*.

The Arabians feem to explain this very well, in their name of this earth; they not calling it *maftich earth*, but *thin beled almaftichi*, that is, *terra regionis maftichis*, the earth of the country where maftich is produced.

MASTICOT, Massicot, or *Yellow Lead*, is the yellow oxyd of lead. (See Lead.) It is fometimes ufed by painters, and it ferves medicinally as a drier in the compofition of ointments or plafters.

The mafticot which is ufed by the Dutch as the ground of their glazing, is prepared by calcining a mixture of one hundred weight of clean fand, forty-four pounds of foda,

fold

fold with us under the name of barilla, and thirty pounds of pearl-afhes.

MASTIFF-Dog, or *Band-dog*, *villaticus*, or *catenarius*, is a fpecies of great fize and ftrength, and a very loud barker. Maowood fays, that it derives its name from *mafe thefefe*, being fuppofed to frighten away robbers by its tremendous voice. Great Britain was formerly fo noted for its maftiffs, that the Roman emperors appointed an officer in this ifland with the title of *Procurator Cynegii*, whofe fole bufinefs was to breed and tranfmit from hence to the amphitheatre, fuch as would prove equal to the combats of the place. Strabo, lib. iv. tells us, that the maftiffs of Britain were trained for war, and ufed by the Gauls in their battles. See Dog.

MASTIGADOUR, or Slabbering-bit, in the *Manege*, is a fnaffle of iron, all fmooth, and of a piece, guarded with pater nofters, and compofed of three halves of great rings, made into demi-ovals of unequal bignefs, the leffer being inclofed within the greateft, which ought to be about half a foot high. A maftigadour is mounted with a head-ftall and two reins. A horfe by champing upon the maftigadour, keeps his mouth frefh and moift.

To put a horfe to the maftigadour, is to fet his croup to the manger, and his head between two pillars in the ftable. Horfes that ufe to hang out their tongues cannot do it when the maftigadour is on; for that keeps their tongue fo much in fubjection, that they cannot put it out.

MASTIGON, in *Geography*, a river of North America, which runs weftward into lake Michigan, about 11 miles N. of La Grande Rivière. At its mouth it is 150 yards wide.

MASTIGOPHORI, Μαστιγοφοροι, among the Greeks, certain officers appointed to preferve the peace, and correct fuch as were diforderly at the Olympic games.

MASTIH, in *Geography*, a town of Perfia, in the province of Kerman; 140 miles E.N.E. of Sirgian. N. lat. 29° 16'. E. long 59 40'.

MASTOIDES, Mastoideus, *Maftoid*, in *Anatomy*, epithets applied to a certain procefs of the temporal bone, and to parts fituated near, or connected with, it. In old writers, the bone altogether is fometimes called os maftoides. The large nipple-like procefs of the bone, behind the ear, is always diftinguifhed by that name; and the portion of the bone including it is called the maftoid portion. (See Cranium.) The cells by which it is excavated, are the maftoid cells. Maftoideus is the name given by Albinus and others to part of the mufcle defcribed in this work under the article Sterno-cleido-mastoideus.

MASTRE, La, in *Geography*, a town of France, in the department of the Ardeche, and chief place of a canton, in the diftrict of Tournon; 15 miles N. of Privas. The place contains 2090, and the canton 11,873 inhabitants, on a territory of 170 kiliometres, in nine communes.

MASTURA, a town of Arabia Petræa, on the borders of the Red fea; 92 miles S.W. of Medina. N. lat. 23° 5'.

MASVAUX, a town of France, in the department of the Upper Rhine, and chief place of a canton, in the diftrict of Befort; nine miles N. of Befort. The place contains 2181, and the canton 9404 inhabitants, on a territory of 192½ kiliometres, in 18 communes.

MASUCO, or Masacon, a town of Portugal, in the province of Tras los Montes; 27 miles S.S.W. of Miranda de Duero.

MASULA, a town of Perfia, in the province of Ghilan; 40 miles N.N.W. of Aftara.

MASULIPATAM, a city and fea-port of Hindooftan, in the circar of Condapilly, near the mouth of the Kiftna river, within the diftrict named "Mefolia" by Ptolemy. This is a place of confiderable trade for chintzes and printed linens. The air is deemed unwholefome; 65 miles S.S.W. of Rajamundry. N. lat. 16° 8' 30". E. long. 81° 12'.

MASURIEH, a town of the Arabian Irak, on the Euphrates; 50 miles W. of Korna.

MASZOW, a town of Hungary; fix miles W. of Rofenburg.

MAT, in *Agriculture*, a fort of covering material, prepared by weaving bafs or other fubftances of the fame fort together. They are moftly brought into this country with different forts of packages. Mats about Sandwich and Dover are ftated by Mr. Young to be made ufe of for covering the fhocks of wheat; by which practice, Mr. Boys affures him, the fample of wheat is improved, fo as that the Dover bakers give a decided preference to it. The mats coft about feven-pence each. They are too expenfive for general ufe.

Mat, *Garden*, a kind of coarfe mat or covering formed of bafs, which is much ufed in gardening, for fheltering various forts of plants in winter and fpring, in frofty and other cold weather; and in fummer for fhading many forts of young or tender kinds occafionally from the fun; and many other purpofes in the different garden departments. They are found to differ greatly in regard to fize and fubftance, there being fmall, middling, and large fizes; but for general ufe, thofe called Ruffia mats are fuperior, both in dimenfions, fubftance, and durability. It may alfo be proper to have fome of the fmaller or middling fizes for particular occafions, and fmall gardens, in which, for fome purpofes, they may be more convenient than large ones. They were formerly fold by moft of the principal nurfery and feedfmen, at from about fix or eight to twelve or fifteen fhillings the dozen, according to fize and ftrength, but for fome years paft the prices have been much higher.

Thefe mats are alfo of effential ufe in all hot-bed works, for covering or fpreading over the lights or glaffes of the frames in the nights, in winter and fpring, to exclude the external night cold; alfo occafionally in the day time in very fevere weather, and heavy falls of fnow or rain. And likewife for occafionally covering feveral forts of fmall young efculent plants in the full ground in beds and borders, in thefe feafons; as young lettuces, cauliflowers, fmall fallad herbs, early radifhes, &c. in the open beds, and under frames and hand-glaffes, to defend them from cutting frofts, fnow, and other inclement weather; and fometimes in raifing, tranfplanting, or pricking out fmall or moderate portions of particular forts of plants, both of the hardy and tender kinds, whether of the efculent or annual flowery kinds in the fpring, on beds or borders of natural earth, or in hot-beds, without frames, by being arched over with hoops or rods. They are likewife extremely ufeful in the fpring and fummer, in hot, dry, funny weather, in fhading feveral forts both in feed-beds before and after the young plants are come up, and in beds of pricked-out fmall young plants, to fhade them from the fun till they take frefh root; as alfo for fhading the glaffes of hot-beds occafionally, when the fun is too powerful for particular forts of plants in the heat of the day, as in cucumbers, melons, and various other kinds.

For kitchen and other garden diftricts furnifhed with wall-trees, they are of great ufe in fpring to cover the trees of particular forts when in bloffom, and when the young fruit is fetting and advancing in its early growth after the decay and fall of the bloom; by which affiftance, in cold winters and fprings, when fharp frofts fometimes prevail, a tolerable good crop is often faved, while in trees fully expofed, the whole is cut off by the feverity of the weather.

In the flower garden and pleafure-ground, they are alfo found useful on different occasions; in the former, in sheltering beds of curious sorts of choice flower-plants, both in their advancing growth, and to protect them from cold in winter and spring; and when in full bloom, to shade and screen the flowers from the sun and rain, to preserve their beauty more effectually, and to continue them longer in blow of a fine lively appearance: as well as to cover beds, &c. in raising various tender annual plants from seed in the spring; and in the latter occasionally in winter to defend some kinds of curious tender evergreens, &c. such as some of the magnolias, broad-leaved myrtle, olive, tea tree, &c. when standing detached and trained against walls, and other places.

And besides in nurseries, they are of considerable utility in the propagation and culture of numerous sorts of tender curious exotics, in defending them from cold, and shading from scorching sun, while they are in their minor growth, &c. They are necessary also for matting round bundles or baskets of tender or curious plants, when conveyed to a distance.

They are also occasionally of great use in severe winters on such glass works as green-houses, hot-houses, forcing-frames, &c. in covering the glasses externally in the nights, and occasionally in the day time.

In using them, when the ends are open or loose, they should be secured by tying the end-threads or strings of the bass close and firm, otherwise they soon ravel out loose in that part, and are spoiled. Where made use of in the work of covering and shading, &c. they should generally in uncovering, if rendered wet by rain or snow, be spread across some rail, hedge, or fence, &c. to dry, before folding them together, that they may be preserved from rotting, otherwise they will not last long.

These mats should never have any bass drawn out of them for tying up plants with, as is too commonly the practice, as by that means they soon become spoiled.

Mat-*grass*, a term applied to a particular sort of thick close grass.

Mat-*weed*, in *Botany*. See Lyceum.

Mat, in *Sea Language*. See Matts.

MATA, La, in *Geography*, a sea-port town of Spain, in the province of Valencia; 22 miles S.S.W. of Alicant.

Mata, a lake of Spain, in the province of Valencia, near the sea-side; which naturally produces an immense quantity of salt, that is the property of the king. The exports have amounted in some years to 100,000 tons weight, chiefly for Holland and the Baltic, as well as for Newfoundland and New England, in order to cure fish.—Also, a river of Africa, which crosses the country of Sabia, and runs into the East India sea, S. lat. 19° 30′.

MATABOON, a small island in the Sooloo Archipelago. N. lat. 5° 2′. E. long. 120° 11′.

MATACA, a bay on the N. coast of the island of Cuba; 36 miles from the Havanna.

MATAFUNDA, in *Antiquity*, a machine for throwing stones, probably by means of a sling. Some derive its name from the words *fund* and *mactare*, sometimes written *matare*, *i.e.* a murdering sling.

MATAGARA, in *Geography*, a town of Africa, in Sugulmessa.

MATAGOLA, a small island in the Pacific ocean, near the coast of Chili. S. lat. 31°.

MATAGUA, a town of the island of Cuba; 92 miles S.E. of Havanna.

MATAIA, a province of South America, towards the river Amazon, between the mouths of Madeira and Tapaise rivers.

MATAJA, a river of Peru, which runs into the Pacific ocean, N. lat. 1° 20′.

MATAIBA, in *Botany*, Aubl. Guian. t. 128. Juss. 249. See Epihielis.

MATAICHI, in *Geography*, a town of New Mexico, in the province of Mayo; 150 miles E.N.E. of Santa Cruz.

MATALA, a town of the island of Candy, anciently called "Metalia," or "Metallum," on the S. coast: which was one of the harbours of Gortynia; 30 miles S. of Candy. N. lat. 34° 36′. E. long. 24° 10′.

MATALI, in *Hindoo Mythology*, is the name given to the person who drives Iravat, the elephant of Indra, and is usually called his charioteer; but we do not recollect any other vehicle usually allotted to Indra than Iravati; see those articles.

MATALOE, in *Geography*, a small island in the Indian sea, near the coast of Africa. S. lat. 11° 40′.

MATALONA, a town of Naples, in Lavora; 13 miles N.N.E. of Naples.

MATAMAN, or Cimbeba, a large country of Africa, near the Atlantic, S. of Benguela, extending from S. lat. 16° to 24°, and from E. long. 13° to 18°.

MATAMBA, an extensive country in the interior part of Africa, bounded on the N. by Congo, on the E. by an unknown country, on the S. by Malamba and Benguela, and on the W. by Angola; about 150 miles from N.W. to S.E., and about the same from N.E. to S.W.: it is divided into five provinces, *viz.* Upper and Lower Umbé, Upper and Little Ganghelli, and Bondo. The capital is St. Maria de Matamba.

MATAMBO, a town of Peru, in the district of Abança; 12 miles N.W. of Cuzco.

MATAN, a town of the island of Borneo, near the W. coast, a little S. of the equinoctial line.—Also, a small island among the Philippines, near the port of Sibu, where the celebrated Magellan was killed in 1521, in an engagement with the natives.

MATANA, a town of Hindoostan, in Oude; 10 miles N.W. of Kairabad.

MATANCHEL, a sea-port on the W. coast of New Mexico, about 20 leagues to the N.E. of the rocks of Ponteque, over which may be seen, in clear weather, a very high hill, with a break on the top, called the hill of Xalisco, eight or nine leagues from the port.

MATANE, Great and Little, rivers in Lower Canada, which fall from the S. into the St. Lawrence near its mouth. The mouth of the Matane rivers is capable of admitting vessels of 200 tons burthen; and the coast near them for 20 leagues abounds in fine cod, fit for exportation. Great numbers of whales have also been seen floating on the water, which might prove a valuable fishery.

MATANZAS Bay, a bay on the N. coast of Cuba. N. lat. 23° 15′. W. long. 81° 2′.

MATAPE', a town of New Mexico, in the province of Sonora: 45 miles S.E. of Pitquin.

MATARAM, a town of the island of Java, and capital of a kingdom on the S. side, near the centre of the island. S. lat. 8° 20′. E. long. 110°. See Java.

MATAREA, or Mataria, a town of Egypt, on the scite of the ancient On, or Heliopolis, celebrated for its excellent water, and famous for a bloody battle fought between the French and the Turks, March 20, 1800, in which the Turks had 8000 men killed and wounded, besides those who perished in the desert; five miles N.E. of Cairo.

MATARIEH, a cluster of small islands in lake Menzaleh.

MATARO, an ancient town of Spain, in the province of of Catalonia; it exifted under the Romans, more within land on a fpot where veftiges of its buildings are ftill found, and was rebuilt by the Moors on its prefent fcite. It is fuppofed to be the ancient Illuro of Ptolemy and Mela. Under the Moors it took its prefent name. It is pleafantly fituated on the fea-fide, at the extremity of a fmall fertile plain, which terminates at the foot of a chain of woody mountains. The old town, built on an eminence, retains its inclofure, its walls, and its gates. Its ftreets are narrow, but the largeft, called "La Riera," which runs through the middle, is broad, ftraight, tolerably well built, and watered by a fmall ftream, with a row of trees by the fide of it. The new town, probably a fauxbourg to the preceding, is much larger, more open, and better conftructed. It has been lately built, and runs towards the eaft as far as the fea-fide: the ftreets are broad, long, and ftraight; the houfes are moftly ornamented with paintings in frefco. It is daily increafing in extent: the furrounding country is fertile and well cultivated, and the town has many fountains of excellent water. Mataro is become a confiderable town by its induftry and commerce; its population, which, about the year 1770, was from 4 to 5000 perfons, is now upwards of 25,000. It has a parifh-church, three convents of monks, two of nuns, and an hofpital. The adminiftration confifts of a military and civil governor, an alcade-major, a port-captain, a minifter, an auditor of the navy, and a garrifon of two fquadrons of cavalry. In the town are four manufactories of printed calicoes, two of calico, feven of lace, 17 of blonds, two of foap, 52 looms for filk-ftockings, 116 for cotton-ftockings, 48 for filk ftuffs and velvets, 89 for ribbons and filk galloons, fix diftilleries for brandy, five manufactories of fail-cloth, eight tan-yards, and 18 manufactories of filk twifts, which yearly make, on an average, about 20,000 pounds weight; 17 miles N.E. of Barcelona. N. lat. 41° 33′. E. long. 2° 19′.

MATATANA, a river of Africa, which runs into the India fea, S. lat. 22° 20′.

MATATANES, a town on the E. coaft of Madagafcar. S. lat. 22° 20′. E. long. 48°.

MATAVAI Bay, or *Port Royal Bay,* a bay near the N. part of the ifland of Otaheite, but opens to the N.W. and in the South Pacific ocean. The infide of the bay has good anchorage. S. lat. 17° 30′. W. long. 149° 13′.

MATAVAI *Point*, a cape of the ifland of Otaheite. S. lat. 17° 29′. E. long. 210° 22′.

MATCH, from the Saxon *maca*, a *companion*, becaufe, fays Johnfon, the match is companion to the gun; a kind of rope, flightly twifted, and prepared to retain fire, for the ufes of artillery, mines, fireworks, &c.

It is made of hempen tow, fpun on the wheel like cord, but very flack; and it is compofed of three twifts, which are afterwards again covered with tow, fo that the twifts do not appear; laftly, it is boiled in lees of old wines; whence its colour. This, when once lighted at the end, burns on gradually and regularly, without ever going out, till the whole is confumed.

It is neceffary, fays Walhuyfen (L'Art Militaire pour l'Infanterie, &c. p. 136, printed in 1653), that every mufketeer knows how to carry his match dry, in moift and rainy weather, that is, in his pocket; or in his hat, by putting the lighted match between his head and hat; or by fome other means to guard it from the weather. The mufketeer fhould alfo have a little tin-tube about a foot long, *viz.* enough to admit a match, and pierced full of little holes, that he may not be difcovered by his match, when he ftands centinel, or goes on any expedition. This was the origin of the match-boxes, worn, till of late, by our grenadiers.

Since fufees have been introduced in lieu of match-lock mufkets, the confumption of matches has been much lefs confiderable than before. See MUSKET.

MATCHADOSH BAY, in *Geography*, a bay on the E. coaft of lake Huron. N. lat. 44° 48′. W. long. 80° 10′.

MATCHAPUNGO, a fmall ifland near the coaft of Virginia. N. lat. 37° 28′. W. long. 75° 44′.

MATCHE, a fmall ifland near the coaft of China. N. lat. 26° 30′. E. long. 119° 54′.

MATCHGONG, a town of Bengal; 25 miles N. of Burdwan.

MATCHING, in the *Wine Trade*, the preparing veffels to preferve wines and other liquors, without their growing four or vapid. See WINE.

The method of doing it is this: melt brimftone in an iron ladle, and, when thoroughly melted, dip into it flips of coarfe linen cloth, take thefe out, and let them cool. This is what the wine-coopers call *match*. Take one of thefe matches, fet one end of it on fire, and put it into the bung-hole of a cafk; ftop it loofely, and thus fuffer the match to burn nearly out; then drive in the bung tight and fet the cafk afide for an hour or two. At the end of this time examine the cafk, and you will find that the fulphur has communicated a violently pungent and fuffocating fcent to the cafk, with a confiderable degree of acidity, which is the gas, and acid fpirit of the fulphur. The cafk may, after this, be filled with a fmall wine, which has fcarcely done its fermentation, and bunging it down tight, it will be kept good, and will foon clarify. This is a common and a very ufeful method; for poor wines would fcarcely be kept potable, even a few months, without it. Nor could ftums be prepared in large quantities without this help. Shaw's Lectures, p. 191.

MATCHOU, in *Geography*, a mountain of Thibet. N. lat. 31° 40′. E. long. 86° 29′.

MATCHTYGONG, a town of Hindooftan; 37 miles N.W. of Benares.

MATCUS, ST., a town of Brazil, in the government of Minas Geraes; 40 miles N.N.E. of Villa Rica.

MATE *of a Merchant Ship*, is an officer who commands in the abfence of the mafter, and fhares the duty with him at fea; being charged with every thing that regards the intended management of the fhip, the direction of her courfe, and the government of her crew.

MATE *of a Ship of War*, is an officer under the direction of the mafter, by whofe choice he is generally appointed, to affift him in the feveral branches of his duty.

Accordingly, he is to be particularly attentive to the navigation in his watch, &c. to keep the log regularly, and examine the line and glaffes by which the fhip's courfe is meafured, and to adjuft the fails to the wind in the fore-part of the fhip. He is alfo to attend diligently to the cables, feeing that they are well coiled and kept clean, when laid in the tier, and fufficiently ferved, when employed to ride the fhip. Finally, he is to fuperintend and affift at the ftowage of the hold, taking efpecial care that all the ballaft and provifions are properly ftowed therein. The number of mates allowed to fhips of war and merchantmen, is always in proportion to the fize of the veffel. Thus a firft-rate man of war has fix mates, and an Eaft Indiaman the fame number; a frigate of twenty guns and a fmall merchant-fhip have only one in each; and the intermediate fhips have a greater or fmaller number, according to their feveral fizes, or to the fervices on which they are employed. Falconer.

Other officers have alfo affiftants, called mates; as the furgeon, gunner, carpenter, boatfwain, cook, and corporal.

MATE *Creek*, in *Geography*, a river of Kentucky, which runs into the Licking, N. lat. 38° 4'. W. long. 83° 41'.

MATEGRIFFON, in the *Military Art*, a machine anciently ufed for throwing both darts and ftones. It was both the deftroyer and terror of the Greeks.

MATELEA, in *Botany*, apparently a barbarous name, for the toleration of which we have offered fome apology under the article HOSTEA. We fhall not attempt to legitimate it, as Linnæus in fome inftances has done, by any Greek pun, or forced derivation; which in this cafe might eafily be done, though it would ftill have no reference to the plant. Aubl. Guian. 277. Juff. 144. Lamarck Dict. v. 3. 726. Illuftr. t. 179. Brown Afclep. in Mem. of the Wernerian Society, v. 1. 36. (Hoftea; Willd. Sp. Pl. v. 1. 1274.) Clafs and order, *Pentandria Digynia*. Nat. Ord. *Contortæ*, Linn. *Apocineæ*, Juff. *Afclepiadeæ*, Brown.

Gen. Ch. *Cal.* Perianth of one leaf, turbinate, inferior, in five deep, ovate, acute, equal fegments. *Cor.* of one petal, wheel-fhaped; tube very fhort; limb in five deep, roundifh, equal fegments, folding obliquely over each other. *Stam.* Filaments five, very fhort, inferted into the bafe of the tube; anthers united into a pentagonal head, each of two cells, burfting tranfverfely, and terminated by a membrane; maffes of pollen affixed to the outer extremity, with refpect to the cells, and covered with the ftigmas; crown of the ftamens fhield-like, lobed. *Pift.* Germens two, ovate, one of them abortive; ftyles two, fhort; ftigmas depreffed, flattifh, recurved. *Peric.* Follicle lanceolate-oblong, acute, ribbed. *Seeds* numerous, imbricated, elliptical, crenate, without wings.

Eff. Ch. Corolla wheel-fhaped, in five round oblique fegments. Crown of the ftamens fhield-like, lobed. Anthers burfting tranfverfely, tipped with a membrane. Stigmas depreffed. Follicle ribbed. Seeds crenate, without wings.

1. M. *paluftris*. Aubl. Guian. t. 109. Native of marfhes in Guiana. An upright *fhrub*, two feet high, or more, with oppofite, lanceolate, acute, entire, fmooth *leaves*, marked with two glands at their bafe, and fupported by fhortifh *footftalks*. *Flowers* green, rather fmall, in fhort, fimple, folitary, axillary clufters. *Follicles* pendulous, three or four inches long. Aublet defcribes a variety with broader, rather elliptical, leaves. Every part, when wounded, difcharges a milky juice.

MATELICA, in *Geography*, a town of Italy, in the marquifate of Ancona; 10 miles W. of Ancona.

MATELLES, LES, a town of France, in the department of the Herault, and chief place of a canton, in the diftrict of Montpelier; feven miles N. of Montpelier. The town contains 325, and the canton 2703 inhabitants, on a territory of 217½ kiliometres, in 14 communes.

MATEMBO, one of Querimba iflands, near the coaft of Africa. S. lat. 12°.

MATEO, ST., a town of Mexico, in the province of New Bifcay; 120 miles S.W. of Parral.—Alfo, a town of New Navarre; 130 miles S.W. of Cafa Grande.—Alfo, a town of Eaft Florida, on a river which runs into the gulf of Mexico; 120 miles W. of St. Auguftine.

MATER *Dura et Pia*, in *Anatomy*, two membranous coverings of the brain and medulla fpinalis. See BRAIN.

MATER *Metallorum*, in *Natural Hiftory*, a name given by the Saxon mineralogifts, and thofe of fome other places, to a peculiar kind of marcafite or mundic, which they fuppofe, according to the expreffion, to be the mother or parent of metals.

The marcafite they call by this name is the common yellow kind, but in a foul ftate, it being ufually mixed with fome poor ore of iron, or with fome ftony matter, which has made it concrete loofely and irregularly, and it is found fometimes formed into thin undulated plates, and fometimes into complex maffes; but is always cavernous or fpungy, or full of fmaller or larger holes. Thefe are often empty; but in fome pieces they contain parcels either of the pure native metals, or of rich ores. Pieces of native copper are found in fome, and ores of iron and tin in others. And it is faid in Saxony, that native filver, in thin plates, is found in fome few.

MATERA, in *Geography*, a city of Naples, in Bafilicata; the fee of an archbifhop; 27 miles S.S.W. of Bari. N. lat. 40° 50'. E. long. 16° 35'.

MATERATA, a town of Iftria; fix miles E.S.E. of Umago.

MATERFILON, in *Botany*, a name given by fome authors to the *jacea nigra*, or common knapweed. Our Englifh name *matfellen* feems a corruption of this. See CENTAUREA.

MATERIA CHEMICA, a term ufed by authors to exprefs fuch bodies as are the peculiar objects of chemical experiments. The materia chemica, in a large fenfe, takes in all the bodies of the globe, all thefe being the fubjects of chemiftry in its extenfive fenfe; but the curious in chemical refearches may be defirous of knowing, in general, what bodies they ought to procure, and have in readinefs for them. Dr. Shaw has given a lift of thefe for his Portable Laboratory; and the reader will find a lift according to more modern arrangement and nomenclature under our article LABORATORY.

Becher long ago advifed the young operator in chemiftry to procure to himfelf a fort of artificial alphabet of nature; and this will ferve the purpofe very well, where no more is meant than a mere materia chemica, to be put in fuch order, that it may be readily had recourfe to in all its parts. With this the young operator is to proceed regularly, as he would do in learning a language. Forming firft fyllables out of the joining of two or more letters of this alphabet; and then words, by combining thefe firft fets together; and finally, whole difcourfes; that is, forming thefe various fimple bodies into mixts, compounds, and decompounds. Becher's Phyf. Subter. p. 179.

To avoid mifcarriages, and prevent being impofed upon, it will be very proper to cultivate a knowledge of the productions of nature in their crude ftate, and peculiar places of growth, where being firft viewed and examined before they are gathered or dug up, an exact knowledge of them, as nature furnifhes them, may be procured. For want of this previous qualification, men, otherwife of great fagacity, have erred in their operations, and perhaps blamed the original author of a procefs, in which they mifcarry; while they are all the while ufing a wrong fubject, or an adulterated or imperfect one, inftead of the true. From this miftake alone, numberlefs complaints have arifen of failure and uncertain fuccefs in the proceffes and experiments recorded even by the beft authors.

The perfon who would work in chemiftry with pleafure and fuccefs, fhould make a fufficiently copious collection of a materia chemica of this kind, all the particulars of which he is well affured of, as to the genuinenefs and perfection of their kinds. Thefe being always ready, will prevent the neceffity

neceffity of fending to the druggift at every turn, where the things fent for are often either not to be had, or only in a fophifticated ftate; when this alphabet of nature, compofed of the feveral materials of chemical refearches, is like the letters in a printing-houfe, diftributed and lodged in proper cells, it may readily be drawn out for ufe as occafion requires. It is impoffible to exprefs with how little expence and trouble, yet with how great profit and pleafure, numerous experiments, and thofe of the moft difficult kind, may be made, when the operator has, in this manner, all his materials about him. Becher tells us, that he has, in this manner, gone through fifty experiments in a day; and, while writing on chemical fubjects, if any difficulty or uncertainty occurred, he immediately got up from his defk, made the neceffary experiment, and fat down again to write the certain fact: fo that he affirms, there was very little more trouble in making the experiment at the fire, than in defcribing the procefs by the pen.

Materia *Medica*, comprehends thofe fubftances, which, felected from the animal, vegetable, or mineral kingdom, and employed either in a fimple or combined ftate, are adapted to heal diforders; or, in other words, it is a collection of remedies. Among the ancients, this collection was very limited and imperfect, and yet formed in a fanciful and arbitrary manner, and frequently with a view to imaginary or fuperftitious virtues annexed to the fubftances which it contained. This is not to be wondered at, when we confider that all arts and fciences have been progreffive in their improvement, and that the urgency of difeafe would lead thofe who ftudied medicine for their own relief, or for the benefit of others, to feek and to multiply remedies. The number of thefe remedies would naturally be augmented from views of intereft; and as the priefts of Efculapius were the firft and chief practitioners of phyfic in Greece, whence the fcience originated, we may fuppofe that fuperftition would invent new remedies, or annex fome myfterious efficacy to thofe that had been already difcovered. Whilft the priefts of Efculapius, thus circumftanced, would endeavour to enlarge their knowledge of remedies adapted to the various diforders that occurred, the temples of their deity afforded peculiar means of preferving the knowledge of the Materia Medica, which they acquired: for it was then common for perfons, who had been cured of their difeafes by remedies prefcribed to them in the temple, to hang up their votive tablets, on which was infcribed fome account of their diforders, and of the remedies by which they had been relieved. The celebrated Hippocrates was one of the firft clinical practitioners, who diffeminated the knowledge acquired in thefe temples; but though his writings are numerous, they are intermixed with fo many additions by different perfons, and in different ages, that it is not poffible, with any fatisfaction, to determine what was the true ftate of the Materia Medica in his time. Although Ariftotle and Theophraftus, foon after the age of Hippocrates, by laying the foundation of natural hiftory, paved the way for a great improvement in the knowledge of the Materia Medica; yet for want of the means of accurately diftinguifhing fubftances from one another, this branch of phyfic remained in much uncertainty and confufion. The writings of the ancient phyficians of Greece, now extant, are few; and of courfe we obtain little information of the progrefs of the Materia Medica among them. We may prefume, however, that they were diligent in exploring more efficacious medicines, and that, upon the whole, they were increafing their number. Erafiftratus, it is faid, fimplified the practice of medicine, and thus retarded the progrefs of the Materia Medica, which was promoted by Herophilus, and by Philinus and Serapion, belonging to the fect of empirics. At Rome the knowledge of the Materia Medica was extended and improved, by the Greek phyficians who practifed at Rome. Among thefe we may reckon Afclepiades, who, indeed, like Erafiftratus, employed only a fmall number of medicines, Celfus, Scribonius Largus, and Andromachus the elder. Diofcorides, who lived in the time of the emperor Vefpafian, is commended by Galen as one of the beft and moft complete writers on the Materia Medica. He has given a long lift of medicines, with fome opinion refpecting each; but Dr. Cullen thinks, that, in feveral refpects, his judgment in general may be fufpected. About the fame time with Diofcorides lived the elder Pliny, who, though eminently learned, was merely a compiler, and often injudicious, particularly with refpect to the Materia Medica. Pliny, however, difcovered more judgment than many of his contemporaries, in condemning the very luxuriant compofitions which at that time were fo much affected. Soon after Pliny appeared the celebrated Galen, who, on the fubject of the Materia Medica, propofed a new fyftem; maintaining that the faculty or power of medicines depends chiefly upon their general qualities of heat and cold, drynefs and moifture. This doctrine, however unfounded and erroneous, was implicitly followed by all the phyficians of Greece who fucceeded Galen, as well as by all the phyficians of Afia, Africa, and Europe, for at leaft 1500 years. When the knowledge of phyfic had very much declined among the Greeks, it was transferred to the Saracens, who were almoft the only perfons in Afia and Africa that cultivated fcience. Several productions of their own climate were added to the Materia Medica of the Greeks: but though they made fome improvements, as, *e. g.* by fubftituting, in place of the more violent and draftic purgatives of the Greeks, feveral of a milder kind; they made no difcovery of any medicines of peculiar power; and as they had derived almoft the whole of their knowledge of phyfic from Greece, fo in every part of it they had adopted nearly entirely the fyftem of Galen. Upon the whole, it does not appear that they made any improvement, either in the general plan of the Materia Medica, or in afcertaining the virtues of particular medicines. One important innovation, indeed, they introduced, which laid the foundation of a confiderable change at a fubfequent period; and this was the application of chemical operations to the fubftances appropriated to medicine. As long as the phyficians of Europe continued to be the fervile followers of the Saracens or Arabians, nothing new occurred among them; but when Conftantinople was taken by the Turks, about the middle of the fifteenth century, many learned Greeks were driven into Italy, and thus the literature of the Greeks was tranfported to the weftern parts of Europe. The fyftem of Galen, however, was adopted by the contending parties both of the Greeks and Arabians: and the Materia Medica, with a few additions by the Arabians, remained as it had been tranfmitted from Galen; being every where explained by the cardinal qualities and their different degrees, with very little reference to any thing acquired by experience.

We have already obferved that chemiftry firft appeared among the Arabians; and there is reafon for believing, that metallic fubftances were the fubjects of fome of their firft operations. Thefe fubjects were principally mercury, and afterwards antimony; and of thefe fubftances we find a great variety of preparations in the "Currus Triumphalis Antimonii," publifhed under the name of Bafil Valentine, and fuppofed to have been written about the end of the fifteenth, or beginning of the fixteenth century. When the chemifts directed the employment of their art to the preparation

paration of medicines, they were foon mifled by the fanatical fpirit which prevailed among them, and indulged the idea of preparing an univerfal medicine, and one which fhould protract life to 1000 years. In the profecution of thefe vifionary fchemes they perfifted, when in the beginning of the fixteenth century Paracelfus appeared. From the chemical practitioners of thefe times he learned the ufe of mercury and antimony; and from fome empirics the ufe of opium. By the ufe of thefe remedies, he cured many difeafes which had baffled the inert remedies of the Galenifts: and thus eftablifhing his fame, he formed a fchool of phyficians, who appeared in oppofition to the eftablifhed fchools, then entirely followers of Galen. Hence the phyficians of Europe were divided into the two fects of chemifts and Galenifts. Early in the feventeenth century, fir Theodore Mayerne, a chemical phyfician, was called over into England, and diftinguifhed himfelf as a great favourer of chemical medicines, and particularly of antimony. His fame feems to have terminated in England all diftinction between the Galenic and chemical practitioners. Hence it merits particular attention, that in the courfe of the fixteenth century, the introduction of the more frequent ufe of chemical medicines, and of the more frequent application of chemiftry to the preparation of them, produced a very great change in the ftate of the Materia Medica. Foffil medicines, fome of which were entirely unknown to the ancients, formed a much greater part of it than formerly; and not only thofe of the metallic, but many of the faline kind, little known before, were now introduced. Diftilled waters alfo, effential oils, quinteffences, and extracts, were admitted by thofe who allowed of chemical remedies at all, to conftitute almoft the whole of the Materia Medica. While chemiftry was thus employed to modify the Materia Medica, it was accompanied by every fpecies of fanaticifm, by the doctrines of aftral influences, animal magnetifm; by pretenfions to alchemy, to panaceas, and to medicines capable of prolonging life. All thefe had fome influence on the Materia Medica; but none were more generally received than the doctrines of fignatures, which has retained its influence till very lately. The doctrines of chemiftry, though attended with many abfurdities, were, however, the moft promifing towards explaining that quality in medicines upon which their virtues depended; and accordingly have ever fince been more or lefs applied to that purpofe. It was about this time that certain phyficians, who prefumed to judge of the conftituent parts of medicines, partly from their chemical analyfis, partly from their fenfible qualities, formed plans of the Materia Medica. After all the fchemes that were formed for inveftigating the virtues of medicines, it muft be acknowledged, that the conclufions formed from any of them can hardly be trufted till they are confirmed by experience; and here it will be proper to take notice of two attempts which were made in England to confult experience with regard to the Materia Medica. The firft was that of Mr. John Ray, who, in his "Hiftory of Plants," thought proper to enumerate the virtues of thofe which were ufed in medicine. About the fame time Mr. Boyle endeavoured to engage the practitioners of phyfic in the ftudy of fpecific medicines, that is, of medicines whofe virtues are learned only from experience. Neverthelefs, from various circumftances, his collection has contributed very little towards the improvement of the knowledge of the Materia Medica. After this time phyficians and chemifts began to treat many vegetable fubftances, either by infufion and decoction in water, or by infufion in fpirituous menftruums, and obtaining extracts in confequence of thefe operations; and labours of this kind have been fince profecuted with diligence. By fuch labours the doctrines of the Materia Medica have been often corrected, and we have been frequently taught not only to diftinguifh the different degrees of the fame quality in different bodies, but they have been particularly ufeful in directing the moft proper pharmaceutical treatment of medicines, and have fometimes afforded an analogy for judging of the virtues of untried fubftances. At a period, which foon followed, a number of different theories prevailed in the fchools of phyfic; which varioufly affected the ftate of the Materia Medica. The Stahlians introduced archeal remedies, and many of a fuperftitious and inert kind; and, on the other hand, the mechanical phyficians, by introducing the Corpufcularian philofophy, or the notion that the fmall parts of bodies acted upon one another by their figure, fize, and denfity, endeavoured to explain the operation of medicines upon the fluids and folids of the human body, in a manner that countenanced many erroneous opinions concerning their virtues. Dr. Boerhaave, adopting this fyftem, contributed to extend its influence. Another circumftance that ferved to injure the writings on the Materia Medica was that of referring the operation of medicines to certain general indications; moft of which have arifen from defects both of phyfiology and pathology, and are neither fufficiently explained nor well underftood. Notwithftanding the imperfections that have been difcovered in the writers on the Materia Medica, and that have been fuggefted by Dr. Cullen, to whom we are indebted for the preceding hints on this fubject, he acknowledges, that, in modern times, and more efpecially during the courfe of the laft century and towards the clofe of it, the Materia Medica has received much correction and improvement. "The progrefs of philofophy has corrected many fuperftitious follies that were formerly intermixed with the doctrines of the Materia Medica. Chemiftry has given us many new medicines, entirely unknown in ancient times; and this fcience, in its progrefs, has not only gradually corrected its own errors, but has taught us to reject many inert medicines, which formerly made a part of the Materia Medica. It has taught us a greater accuracy in preparing all its peculiar productions, and to lay afide many of thofe operations with which it had amufed the phyfician, and had impofed much ufelefs labour upon the apothecary. In particular, it has inftructed us how to make the combinations of medicines with greater correctnefs and propriety; and in all thefe refpects has rendered the whole of the pharmaceutic treatment of medicines more fimple and accurate than it was before. Chemiftry has thus greatly improved the ftate of the Materia Medica, and has led phyficians to a difcernment that fhould reject that luxuriancy of compofition formerly fo frequent; and which, even at prefent, in moft parts of Europe, is far from being fufficiently corrected. The reformation in this refpect has not yet taken place to any remarkable degree, excepting in the northern countries of Europe, in Britain, Sweden, Denmark, and Ruffia."

Of the writers on the fubject of the Materia Medica, whofe names and works are enumerated by Dr. Cullen, the firft we fhall mention is John Schroeder, of the 17th century, an edition of whofe work in the German language was publifhed in 1746, and which has been literally quoted by Ray, Dale, and Alfton. The next writer is John Bauhin, who, in his "Hiftoria Plantarum," has written on the virtues of thofe plants which make a part of the Materia Medica. Of this author Dr. Cullen fays, that, exclufively of his botanical merit, "he did not deferve to be followed as he has been by Ray and others after him; and by no means deferves to be read now." Simon Pauli fucceeded Bauhin, and was himfelf followed by Georgius Wolfgangus Wedelius,

Wedelius, who was an abettor of the doctrine of ſignatures, as well as a believer in the power of amulets. Emanuel Koenig, towards the end of the 17th and ſoon after the beginning of the next century, publiſhed all the parts of the Materia Medica, in a manner which Cullen ſpeaks of in degrading terms. John Baptiſt Chomel publiſhed his "Abregé de l'Hiſtoire de Plantes uſuelles," in 1712, and has choſen, ſays Cullen, a proper plan of arranging the ſubjects of the Materia Medica, according to the ſimilarity of their virtues in anſwering the general indications of cure, but he has executed it very imperfectly. Stephen Francis Geoffroy, though a man of genius, and in many reſpects of good judgment, has not always manifeſted it in his writings on the Materia Medica. Mr. Lieutaud, in his "Synopſis Univerſæ Praxeos Medicæ," has diſtributed the ſubjects of the Materia Medica according to the general qualities by which they are adapted to the ſeveral indications ariſing in the practice of phyſic; but the indications marked are for the moſt part ill defined, too general as well as too complicated to convey any inſtruction to young practitioners. M. Ferrein has, ſince the time of M. Lieutaud, publiſhed at Paris a "Traité de Materie Medicale, &c." which Dr. Cullen pronounces to be ſuperficial and incorrect, and unworthy of the author, who was a man of learning and judgment. The "Precis de Materie Medicale" of M. Venel, publiſhed by M. Carrere, is, as Cullen thinks, the moſt judicious writing that had appeared in France on the ſubject before his time. Of the writers of Germany Dr. Cullen mentions Zorn, G. Henry Bahr, Buchner, Loeſeche, and J. Fred. Cartheuſer. The latter is author of the "Fundamenta Materiæ Medicæ," a work of deſerved reputation, in which the ſeveral ſubjects are diſtributed according to their ſenſible qualities, or to their more obvious chemical conſtitution, and many ſubſtances are very properly aſſociated by their natural affinities. But this author, ſays Cullen, often attempts to explain the virtues of medicines by their chemical conſtitution in a manner that is not ſatisfactory. He has alſo employed general terms, which are not only ill defined, but alſo very often complicated, and ſometimes altogether improper. In 1758, the learned and induſtrious Rud. Aug. Vogel publiſhed his "Hiſtoria Materiæ Medicæ," of which Dr. Cullen does not ſpeak in very high terms. Another German profeſſor, H. Jo. Nepam. Crantz, publiſhed a treatiſe of the "Materia Medica et Chirurgica," which has not contributed to advance the knowledge of the Materia Medica. Profeſſor Stielmen of Straſburg, in his "Inſtitutiones Materiæ Medicæ," has diſtributed medicines according to their indications, but with a brevity that often renders him obſcure. He has alſo publiſhed a "Pharmacopeia Generalis," which Dr. Cullen cenſures partly for its ſuperfluities, and partly on account of its being ſuperficial and incorrect. But the errors and defects of preceding writers have been corrected and ſupplied by the "Apparatus Medicaminum" of the very learned and ingenious profeſſor Murray of Gottingen; the moſt complete and perfect work, in Cullen's eſtimation, that has ever appeared upon the ſubject. "The author has, with great judgment and medical diſcernment, from former writers, and more eſpecially from thoſe of lateſt date, collected every thing which deſerved to be repeated. He every where diſcovers an intimate acquaintance with all the writers on the ſubject, and always makes a judicious ſelection of what they afford. By his diſtributing the vegetable ſubſtances according as they belong to the ſeveral natural orders marked by the botaniſts, he has aſſociated the ſubſtances of ſimilar qualities and virtues, in a manner that may be of great advantage to ſtudents." An improved edition of this work was publiſhed by Althof at Gottingen, in 1793, &c. in ſix volumes, 8vo. To the Apparatus, &c. by Murray, was added a work of the ſame kind, with the ſame title, comprehending the mineral kingdom, by profeſſor Gmelin, in two volumes, publiſhed at Gottingen in 1795.

In Sweden the celebrated Linnæus takes the lead, of whom we here need ſay nothing, but may content ourſelves with referring to his biographical article. According to Dr. Cullen, our attention, with reſpect to the whole that Linnæus has delivered on the Materia Medica from vegetables, is very much ſuperſeded by the work given us on the ſame ſubject by his ſcholar Bergius. The "Materia Medica ex Vegetabilibus," by Petrus Jonas Bergius, is a work of great value and deſerving peculiar notice.

Of Britiſh writers on the ſubject of the Materia Medica Dr. Cullen mentions Mr. Ray, Dr. Dale, Dr. Alſton, and alſo Dr. Hill, who publiſhed a compilation without ſelection or judgment. He ſpeaks with deſerved commendation of the "Materia Medica" of Dr. Lewis, more eſpecially as publiſhed and judiciouſly enlarged by Dr. Aikin. Dr. Rutty, of Dublin, after forty years labour in preparing it, has publiſhed his "Materia Medica Antiqua et Nova," which Dr. Cullen appretiates at a low rate. Dr. Cullen's "Treatiſe of the Materia Medica," in two volumes 4to. was publiſhed in 1789. Dr. Woodville's "Medical Botany," of which a ſecond edition was publiſhed in 1810, with his laſt corrections, is well known, and highly valued: and we may here add that in this year (1812) Dr. Stokes, well known for his botanical and medical attainments, has publiſhed a work of ſimilar title and deſign to that of Dr. Woodville.

Having given a compendious abſtract of the hiſtory of the Materia Medica, and an enumeration of ſome of the chief writers on the ſubject, we ſhall now proceed to detail, as briefly as poſſible, the different methods of claſſification or arrangement which have been adopted by various writers; premiſing in general that the means by which the remedial or medicinal characters of different ſubſtances are determined in the preſent day are their own ſenſible qualities, their botanical affinity, their chemical analyſis, and general experience. Of all the different modes of arrangement that have been adopted, the moſt ſimple is that of the alphabetic form, but from this we can derive no information with regard to the ſpecific virtues of various ſubſtances admitted into our catalogue of the Materia Medica. Another mode of arrangement is founded on the claſs of bodies, or kingdom, to which the different ſubſtances belong: and thus we obtain three general diviſions of animal, vegetable, and mineral ſubſtances. But this method of claſſification is liable to the ſame objection with the former, as it is too general, indiſcriminating, and uninſtructive. A more eligible and uſeful arrangement is that to which we are led by an inveſtigation of the ſenſible and moſt obvious qualities of medicinal ſubſtances: and accordingly we conſider them as acid, alkaline, acrid, aſtringent, aromatic, glutinous, unctuous, bitter, emetic or cathartic. This mode of diſtribution was ſuggeſted by Cartheuſer, though he was under a neceſſity of deviating from it in his actual arrangement of various ſubſtances; and, indeed, it is too vague and unappropriate to admit of general application: for ſome ſubſtances have no diſcriminating ſenſible quality; others poſſeſs ſeveral qualities ſo nearly ſimilar, that it is difficult to refer them to one claſs in preference to another: and others again reſemble one another in their ſenſible qualities, and yet are very different in their effects on the animal frame. Another mode of arrangement was adopted by Vogel, who claſſed his medical materials according to their effects on the human body.

These

Thefe are the general divifions (fays an anonymous writer in "Nicholfon's Britifh Cyclopædia," of whofe article we fhall here avail ourfelves as far as it is appropriate to our purpofe) or claffes into which fimple medicines are partitioned under this fyftem; but when we begin to confider their virtues more particularly, a variety of inferior divifions muft neceffarily enfue. Thus, of the relaxing medicines, fome, when externally applied, are fuppofed merely to foften the part; and in fuch cafe are called emollients; while others which are fuppofed to have a power of augmenting the difpofition of the fecernents of an inflamed part to the fecretion of pus, are called maturants or fuppuratives. Sedative medicines, that have the power of affuaging pain, are denominated paregorics; if they altogether remove or deftroy pain, they are called anodynes; if they take off fpafm, antifpafmodics; if they produce quiet fleep, hypnotics; if a very deep and unnatural fleep, together with confiderable ftupefaction of the fenfes, narcotics. Tonic medicines, in like manner, obtain the name of corroboratives, analeptics, or nervines, when they flightly increafe the contractile power of the folids; but of aftringents or adftringents, if they do this in a great degree. Some of this order of medicines have been fuppofed to promote the growth of flefh, to confolidate wounds, and reftrain hæmorrhages, and hence the names of farcotics and traumatics, or vulneraries, names, however, which may well be difpenfed with, as the quality is very queftionable, and perhaps altogether erroneoufly afcribed. Other aftringents, again, are denominated repellent, difcutient, ftimulant, or attractive, according to the refpective modes by which they are conceived to promote one common effect. Medicines of the inflammatory tribe, are, in like manner, divided into veficatories or blifters, if by their application they raife watery bladders on the fkin; cathæretics, efcharotics or corrofives, if they eat into and deftroy the fubftance of the folid parts themfelves; and rubefactive or rubefacient, if poffeffed of lefs power than the veficatories, they merely produce a rednefs on the part to which they are applied, by increafing the action of a part, and ftimulating the red particles of the blood, into veffels which do not naturally poffefs them. The alterant tribe is divided into abforbents, antifeptics, coagulants, refolvents, calefiants, and refrigerants, according to the peculiar mode by which the different individuals of this tribe are fuppofed to operate. The evacuants are generally fubdivided from the nature of the humour they are fuppofed to difcharge: emetics, if they evacuate the contents of the ftomach by vomiting; cathartics, if they induce purging; laxatives, if they produce a moderate difcharge of feces without pain or ficknefs; eccoprotics, if the difcharge be greater, but ftill confined to the common nature of the feces themfelves. Thus again they are named diaphoretics, if they promote the expulfion of humours through the pores of the fkin with a fmall increafe of action; fudorifics, if the increafe of action be greater, and the difcharge more copious. Such as excite urine are called diuretics; fuch as produce evacuation from the glands of the palate, mouth, and falivary ducts, falivating medicines; thofe that promote the difcharge of mucus from the throat, apophlegmatics; thofe that evacuate by the nofe, ptarmics, errhines, fternutatories; and thofe which promote the menftrual difcharge, emmenagogues. To this order alfo, fome writers reduce thofe medicines which expel any preternatural bodies, as worms, ftones, and flatus or confined air: of thefe the firft are called anthelmintics; the fecond, and efpecially when directed to the bladder, lithontriptics; and the third, carminatives.

This fyftem admits of various modifications; and authors have differed in the number and in the denominations of the claffes which they have adopted. Thus, Dr. Cullen has diftributed the various medicinal fubftances which he has introduced into the following twenty-three claffes:

Aftringents	Antacids
Tonics	Antalkalines
Emollients	Antifeptics
Corrofives	Errhines
Stimulants	Sialagogues
Narcotics	Expectorants
Refrigerants	Emetics
Antifpafmodics	Cathartics
Diluents	Diuretics
Attenuants	Diaphoretics
Infpiffants	Menagogues.
Demulcents	

Dr. Darwin comprehends all medical fubftances under feven claffes:

Nutrients	Invertents
Incitants	Revertents
Secernents	Torpents.
Abforbents	

Whilft Dr. Cullen's claffification has been thought too diffufe, and Dr. Darwin's much too contracted, and adapted merely to his own exceptionable fyftem of nofology, Dr. Kirby, in his fmall tract, entitled "Tables of the Materia Medica," has adopted eighteen claffes, which are, upon the whole, judicioufly felected, though his arrangement is not altogether unobjectionable. Independently of the general arrangement of medical fubftances, there is another circumftance which deferves attention, and that is the nomenclature by which they ought to be diftinguifhed. As the new nomenclature of Lavoifier is now generally adopted in the Pharmacopeias of different colleges of medicine, it will be followed in the annexed table. The compiler of the table has alfo been anxious to exhibit, in every inftance, a glance at the common dofe for adult age, as well as to fpecify in terms as abbreviated as poffible, the name of the country in which the different articles exift indigenoufly; the part or organ of the fubftance employed; and the difeafe in which it is fuppofed to be efficacious. The claffification is as follows, and every clafs is fubdivided, as far as poffible, into an animal, a vegetable, and a foffile fection.

Emetics	Refrigerants
Expectorants	Aftringents
Diaphoretics	Tonics
Diuretics	Stimulants
Cathartics	Antifpafmodics
Emmenagogues	Narcotics
Errhines	Anthelmintics
Sialagogues	Abforbents.
Emollients	

CLASS I. EMETICA.

Sect. I. Animalia.

Murias Ammoniæ. Edin.
Sal ammoniacum. Lond. Dub.
Britannia.
Aq. carbonatis ammoniæ. E.
Aq. ammoniæ. L.
Liquor alkali volat. mitis. D. } dr. 1—2.

Sect.

SECT. II. VEGETABILIA.

Anthemis nobilis. E.
Chamæmelum. L. D.
Brit. Floſ. Infuſ. dr. 2—4. ad. aq. lib. $\frac{1}{2}$.
Aſarum europæum. E.
Aſarum. L. D.
Brit. Ital. Folia. Pulv. dr. $\frac{1}{2}$—1.
Centaurea benedicta.
Carduus benedictus. L.
Inſul græc. Folia. infuſ. vel decoct.
Cephælis ipecacuanha.
Ipecacuanha. L. E. D.
India occid. Brazil. Radix. Pulv. gr. 15—25.
Vinum ipecacuanhæ. L. E. D. unc. 1—2.
Nicotiana Tabacum. E.
Nicotiana. L.
America. Folia. Fum. Cataplaſm.
Olea europæa. E.
Oliva. L. D.
Europ. merid. Fructus oleum expreſſ.
Ad Venena.
Scilla maritima. E.
Scilla. L. D.
Eur. merid. Rad. Pulv. gr. 4—10.
Acetum. Scillæ marit. E.
Acet. ſcillæ. L. D. unc. $\frac{1}{2}$—1.
Sinapis alba. E.
Sinapi. L. D.
Brit. Seminis pulvis aqua commixt. dr. 1.

SECT. III. FOSSILIA.

Sulphas Cupri. E.
Cuprum vitriolat. L. D.
Brit. Solut. gr. 2—5.
Ad Venena.
Sulphuretum antimonii. E.
Antimonium. L. Stibium. D.
Brit.
Oxidum Antimonii cum Sulphur. vitrificat. E.
Antimonium vitrificatum. L.
Vinum Antimonii. L.
Tartris Antimonii. E.
Antimonium tartariſatum. L. } gr. 1—4. dos. repetit.
Tartarum Stibiatum. D.
Vinum Tartrit. Antimon. E. unc. $\frac{1}{2}$—$1\frac{1}{2}$.
Antimon. tartar L.
Tartari ſtibiat. D. dr. 2—6.
Zincum. E.
Sulphas Zinci. E.
Zincum vitriolatum. L. D. } gr. 10—30.

CLASS II. EXPECTORANTIA.

SECT. I. VEGETABILIA.

Cephælis Ipecacuanha. Pulv. gr. 1. 3tia aut 4ta qu. hor.
Peripneumon. noth. Aſthma.
Nicotiana Tabacum. Fumus.
Scilla maritima.
Acet. Scil. maritim. dr. 2—4.
Syrup Scill. maritim. E.
Oxymel Scillæ. L. D.
Tinctura Scillæ. L. gt. 10—dr. 1.
Pilulæ Scillæ. L. D.
Scilliticæ. E. } gr. 10—15.
Conſerva Scillæ, L. gr. 30—40.
Allium ſativum. E.
Allium. L. D.
Eur. merid. Rad. recens. dr. 1—2.
Syrupus Allii. L. coch 1. ſubinde.
Ammoniacum. E. L. D.
India. Gum-reſin. Pil. Miſt. gr 10—20. dos. rep.
Lac Ammoniaci. L. unc. 1—2. dos. rep.
Arum maculatum. E.
Arum. L.
Brit. Rad. recens.
Conſerv. Ari. L. dr. $\frac{1}{2}$—1.
Colchicum autumnale. E.
Colchicum. L.
Brit. Rad. recens.
Syrupus Colchici autumnal. E. } dr. 2—unc. 1.
Oxymel Colchici. L.
Ferula Aſa fœtida. E.
Aſa fœtida. L. D.
Perſia. Gum-reſin. Pil. Miſt. gr. 10—15. dos. rep.
Lac Aſæ fœtidæ. L. unc. 1—2. dos. rep.
Hyſſopus officinalis.
Hyſſopus. D.
Brit. Herba.
Marrubium vulgare. L.
Brit. Folia. Syrup.
Myrrha. L. E. D.
Arab. Abyſſin. Gum-reſin. Pul. Pil. gr. 10—dr. $\frac{1}{2}$.
Pimpinella Aniſum. E.
Aniſum. L. D.
Aſia. Semin. Infuſ.
Ol. volat. Pimpinell. Aniſi. E.
Eſſent Aniſi. L. gr. 2—6.
Polygala Senega. E.
Seneka. L. D.
Amer. Rad.
Decoctum. Polygal. Senegæ. E. unc. 1—$1\frac{1}{2}$.
Cynanch. tracheal. Pneumon.
Styrax Benzoin. E.
Benzoinum. D.
Benzoe. L.
Sumatra. Balſam.
Acidum Benzoicum. E.
Sal Benzoini. D. } gr. 1—2. dos. repet.
Flores Benzoes. L.
Tinct. Benzœis. compoſ. L. gt. 15—30.
Alcohol.
Spirit. Vini rectificat L. D.
Æther Sulphuricus. E. } forma vaporis.
vitriolicus. L. D.
Aſthma.

SECT. II. FOSSILIA.

Sulphuretum Antimonii.
Tartris Antimonii. gr. $\frac{1}{3}$—$\frac{1}{2}$. ſubinde.
Vinum. Tartrit. Antimonii. E. dr. 1—2.
Antimonii tartaris. L. D. gt. 30—d. 1.
Sulphuretum Antimonii precipitat. E*.
Sulphur Antimonii præcip. L. } gr. 3—5.
Stibii rufum. D.
Sulphur ſublimatum. E.
Flores Sulphuris. L. D.
Sulphur ſublimat. lotum. E. } gr. 15—dr. $\frac{1}{2}$.
Flores Sulphuris loti. L. D.
Oleum Sulphuratum. L. D. E. gt. 10—20.
Petroleum Sulphuratum. L.
Trochiſci Sulphuris. L.
Aſthma, &c.

* This ſhould have been called *Hydroſulphuretum.*

CLASS

CLASS III. DIAPHORETICA.

A. *Mitiora.*

Sect. I. Animalia.

Murias Ammoniæ.
Aqua Carbonat. Ammoniæ. gt. 50.
Carbonas Ammoniæ. E.
Ammonia præparata. L. } gr. 5—10.
Alkali volatile mite. D.
Alcohol Ammoniatum. E.
Spirit. Ammoniæ. L.
Alkali volatil. D. } gt. 30—dr. 1.

Sect. II. Vegetabilia.

Anthemis nobilis.
Infuſ. calid.
Centaurea Benedicta.
Ibid.
Myrrha.
Pulv.
Allium ſativum.
Acidum Acetoſum.
Acetum. L. D.
Serum lactis Aceto coacti.
Rheumatiſm.
Acidum Acetoſum diſtillat. E.
Acetum diſtillatum. L. D.
Aqua Acetitis Ammoniæ. E.
Ammoniæ acetatæ. L. } dr. 3—6.
Liq. Alkali volat. acetat.
Arctium Lappa. E.
Bardana. L. D.
Brit. Rad. Decoct.
Artemiſia Abrotanum.
Abrotanum. L.
Eur. merid. Folia. Infuſ.
Ariſtolochia Serpentaria. E.
Serpentaria. L. D.
Americ. Rad. Pulv. gr. 20—30. 6ta quaq. hor.
Tinctur. Ariſtoloch. Serpentar. E.
Serpentar. L. } dr. 3—6.
Daphne Mezereum. E.
Mezereum. L.
Mezereon. D.
Eur. ſeptentr. Radicis cortex. Pulv. gr. 1.
Decoctum Daphnes Mezerei. E. unc. 1—2.
Syphil. Morb. cutan.
Dorſtenia Contrajerva. E.
Contrayerva. L. D.
Amer. merid. Rad. Pulv. gr. 30—40. 4ta qu. hor.
Decoct.
Febr. Cynanch.
Pulv. Contrajerv. comp. L. gr. 30—40.
Fumaria officinalis.
Fumaria. D.
Brit. Herba. Infuſ.
Laurus Saſſafras. E.
Saſſafras. L. D.
Amer. ſept. Ling. Rad. Cort. Decoct.
Salvia officinalis. E.
Salvia. L. D.
Eur. mer. Folia. Infuſ. ad libitum.
Sambucus nigra. E.
Sambucus. L. D.
Brit. Baccæ. Succus expreſſus.
Succus baccæ Sambuc. ſpiſſat. L.
Smilax Sarſaparilla. E.
Sarſaparilla. L. D.
Ind. Occ. Rad. Decoct.
Decoctum Smilac. Sarſaparill. E.
Sarſaparill. L. D. } lib. 1—in die.
compoſ. L. Ibid.
Ad morbos cutan.
Solanum Dulcamara. E.
Dulcamara. E.
Brit. Stipites. Decoct.
Supertartris Potaſſæ. E.
Cryſtalli Tartari. L. D.
Gallia, &c. Pulv. Solut. ſcr. 1—dr. 1. ſæpius in die.

B. *Fortiora.*

Sect. I. Animalia.

Moſchus moſchiferus. E.
Moſchus. L. D.
Aſia. Mætries prope Umbilic. collecta. Bol
Hauſt. gr. 10—20.
Miſtura moſchata. L. unc. 1—2.

Sect. II. Vegetabilia.

Aconitum neomontanum.
Aconitum napellus. L. E. D.
Eur. mer. Folia Pulv. Tinctur. gr. $\frac{1}{2}$—2.
Succus ſpiſſat. Aconit napell. E. gr. $\frac{1}{2}$—2.
Rheumat. Podagr. Paralyſ.
Guaiacum officinale. E.
Guaiacum. L. D.
Ind. Occ. Ling.
Cort. Dec. Gum-reſin. Pulv. Pil. Emulſ. gr. 10—30.
Decoct. Guaiaci offic. comp. E. lib. $\frac{1}{2}$—1 in die.
Ad morb. cutan.
Tinctur. Guaiac. offic. dr. 2—4.
Ammoniæ. E.
Guaiaci. L. } dr. 1—3.
volatilis. D.
Rheumatiſm.
Laurus Camphora. E.
Camphora. L. D.
Ind. Orient. Bol. Miſt. gr. 5—20.
Miſtura Camphorata. L. unc. 2—4.
Emulſio Camphorata. E. unc. 1—3.
Papaver ſomniferum. E.
Pap. album. L. D.
Opium.
Aſia. Succus ſpiſſ. capſul. Pil. Pulv. gr. 1—2.
Tinctura Opii. L. E. D. gt. 25—50.
Tinct. Opii camphorat. L. dr. 2—6.
Ammoniata. E. dr. 1—1$\frac{1}{2}$.
Pulv. Ipecac. et Opii. E.
compoſ. L. D. } gr. 10—20.
Rhododendron Chryſanthum. E.
Siberia. Fol. Summit. Decoct. dr. 2—4. ad lib. 7.—unc. 1—2. bis in die.
Rheumat. Podagr.

Sect. III. Fossilia.

Sulphuretum Antimonii.
Tartris Antimonii. gr. $\frac{1}{8}$ 6ta qu. hora.
Vinum Tartrit. Antimon. E. dr. 2.
Antimon. tartar. L. dr. 1.
Sulphuret. Antimon. præp. gr. 1—2.
Sulphur Stibii fuſcum. D. gr. 1—1$\frac{1}{2}$.

Oxidum

Oxidum Antimon. cum phosphate Calcis. E. } gr. 4—6. 4ta aut 6ta quaq. hor.
Pulvis Antimonialis L.
Stibiatus D.
Antimonium calcinatum L. gr. 10—15.
Calx Stibii præcipitat. D.
Febres. Cynanchen. Pneumon. Rheumat. Variol. Rubeol. Scarlatin. Catarrh.
Dysenter, &c.
Sulphur sublimatum.
Sulph. sublimat. lat E. } gr 12—30.
præcipitat. L.
Hydrargyrum.
Hydrargyrus. L. E. D.
Hungariæ, &c.
Hydrargyr. purificat. L. E. D.
Submurias Hydrargyr. E. } gr. 1. omn. nocte.
Calomelas L.
Hydrarg. muriat. mit. sublim. D.
Rheumat.

CLASS IV. DIURETICA.

Sect. I. Animalia.

Lytta vesicatoria.
Meloe vesicatoria. E.
Cantharis. L. D.
Eur. mer. Pulv. gr. $\frac{1}{2}$—1. 4ta vel 6ta qu. hor.
Tinctur. Meloes vesicat. E.
Cantharid. L. gt. 10—20.
Ischur. Hydrop.
Oniscus Asellus. E.
Millepedes. L.
Brit.

Sect. II. Vegetabilia.

Asarum europæum. Rad. Decoct.
Hydrop.
Nicotiana Tabacum. Infus. unc. 1. ad lib. 1. gt. 60—80.
Hydrop. Dysur.
Scilla maritima. Pulv. gr. 1—2. bis terve in die.
Tinctur Scillæ. gt. 20—30.
Hydrop.
Allium sativum.
Colchicum autumnale.
Syrup. Colchici. E. } dr. 1—4. bis terve in die.
Oxymel Colchica. L.
Acetum Colchici. D.
Hydrop.
Polygala Senega.
Decoct. Polygal. Seneg. unc. 1—1$\frac{1}{2}$.
Acidum Acetosum.
Acetis Potassæ. E. } scr. 1—4.
Kali acetatum. L.
Alkali vegetabile acetat.
Hydrop. Icterum.
Daphne Mezereum.
Decoct. Daphn. Mezerei. unc. 1—2.
Smilax Sarsaparilla.
Decoct. Sarsaparill. com. ad libit.
Solanum Dulcamara. Decoct.
Supertartris Potassæ Solut. unc. $\frac{1}{2}$. in die.
Hydrop.
Allium Cepa.
Cepa. D.
Cult. Rad. recens ad libit.
Cissampelos Pareira.
Pareira brava. L. D.
Ind. Occid. Rad.
Cochlearia Armoracia. E.
Raphanus rusticanus. L. D.
Brit. Rad. recens. Infus.
Hydropes.
Copaifera Officinalis. E.
Balsamum Copaiva. L. Copaiba. D.
Ind. Occ. Amer. Resin. Gutt. Emuls. gtt. 20—60.
Cynara Scolymus. E.
Cin. Scolymus. E.
Cinara. L. D.
Eur. mer. Folia. Succ. express. unc. $\frac{1}{2}$—1. bis in die.
Hydrop.
Digitalis purpurea. E.
Digitalis. L. D.
Brit. Fol. Pulv. gr. 1. bis in die. Infus. Decoct.
Hydrop.
Juniperus communis.
Juniperus. L. D.
Brit. Bacc. scr. 1—dr. $\frac{1}{2}$. Cacumen. Infus. ad. libit.
Spir. Juniper. commun. comp. E. } unc. $\frac{1}{2}$—1. dilut. subind.
compos. L. D.
Ol. Juniper. L. D.
commun. E.
Juniperus Lycia.
Olibanum. L. D.
India. Gum-resin.
Leontodon Taraxacum.
Taraxacum L. D. Rad.
Pinus Sylvestris. E.
Terebinthina vulgaris. L. D.
Brit. Resina et ol. volat. Gutt. Enema. Pill. gr. 15—20.
Ol. Volat. Terebinth rect. gtt. 20—30.
Pinus Larix.
Terebinthina Veneta. L. D.
Brit. Resina. Enema. Pill.
Spartium scoparium. E.
Genista. L. D.
Brit. Sem. Cacum. Decoct. ad libit.
Ulmus campestris. E.
Ulmus. L. D.
Brit. Cort. intern. Decoct.
Decoct. Ulmi. L. unc. 4—8. sæpius in die.
Ad. morb. cutan.

Sect. III. Fossilia.

Hydrargyrum.
Murias Hydrargyri. E. } gr. $\frac{1}{6}$—$\frac{1}{4}$.
Hydrargyrus muriatus. L.
Hyd. mur. corros. D.
Ad morb. cutan.
Nitras Potassæ. E.
Nitrum. L. D.
India. Pulv. gr. 5—15.
Nitrum purificat. E. L. u. s.
Acidum Nitrosum. L. E. D. dr. 1—2. ad Aquæ lib. 1. in die.
Spir. æther. nitros. L. E. D. gtt. 30—60. sæp. in die.

CLASS V. CATHARTICA.

A. *Mitiora.*

Sect. I. Animalia.

Mel. L. E. D.

Brit.
Mel deſpumatum. E. L. D.

SECT. II. VEGETABILIA.

Anthemis nobilis.
Decoct Anthemid. nobil. E. Enema.
Olea europæa. Oleum. Enema.
Supertartris Potaſſæ. Pulv. dr. 2—4.
Tartris Potaſſæ. E.
Kali tartariſatum. L. } dr. 2—6.
Alkali vegetabile tartariſat. D.
Tartris Potaſſæ et Sodæ. E.
Natron tartariſatum. L. } unc. 1—2.
Sal Rupellenſe. D.
Ad Febres. Phlegmas. Hæmorrhag. Comata. Colicam.
Choleram. Hydropes. Icterum.
Caſſia fiſtula. E.
C. fiſtularis. L. D.
Ind. Or. et Occ. Fruct. Pulpa. ad libit.
Electuar. Caſſiæ. L.
fiſtul. E. } unc. $\frac{1}{2}$—1.
C. Senna. E.
Senna. L. D.
Ægypt. Folia. Pulv. Infuſ.
Pulvis Sennæ compoſit. L. dr. $\frac{1}{2}$—1.
Febres, &c.
Electuar. Caſſiæ Sennæ. E.
Sennæ. L. D. } dr. 2—6.
Infuſum Sennæ. Simpl. L.
Sennæ. D. } unc. 1—3.
tartariſat. L.
Infuſ. Tamarind. Indic. cum. Caſſ. Sennæ. E. unc. 1—3.
Tinctura Sennæ. comp. E.
Sennæ. L. D. unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Colicam.
Ficus Carica.
Carica. L. D.
Eur mer. Fruct.
Fraxinus Ornus. E.
Manna. L. D.
Eur. mer. Succ. concret. Solut. Elect. unc. 1—1$\frac{1}{2}$.
Syrupus Mannæ. D.
Prunus Domeſtica. E.
Pr. Gallica. L. D.
Eur. mer. Fruct. ad. libit.
Roſa Damaſcena. L. D.
Roſa centifolia. E.
Eur. mer. Petala.
Aq. Roſæ. centifolia. E.
Roſæ. L. D.
Syrup. Roſæ. centifol. E.
Roſæ. L. D.
Saccharum officinale. E.
Sacch. non. purificat. L. D.
Ind. Occid. Succ. Spiſſat.
Tamarindus Indicus. E.
Tamarindus. L. D.
Ind. Occ. Fruct. Pulpa. unc. 1—2. Infuſ.
Viola odorata. E.
Viola. L. D.
Brit. Petala. Infuſ.
Syrupus Violæ odoratæ. E.
violæ. L. D.

SECT. III. FOSSILIA.

Sulphur ſublimatum.
Sulphur. ſublimat. lotum. dr. 1—2.
Ad Hæmorrhag. Morb. cutan. Obſtipat.
Sapo Hiſpanus. L. E. D.
Hiſpan. Pil. Enema.
Icterum.

B. *Fortiora.*

SECT. I. ANIMALIA.

Cervus Elaphus. E.
Cervus. L. Cornu cervinum. D.
Phoſphas Calcis.
Phoſphas Sodæ. E. unc. 1—2.

SECT. II. VEGETABILIA.

Nicotiana Tabacum. Fum. Infuſ. pro Enemat.
Colicam Obſtipat.
Sambucus nigra. Cortex interior Decoct. unc. 1. ad lib. 1. in die.
Hydrop.
Pinus ſylveſtris
Larix } Terebinthina Enemat.
Aloe perfoliata. E.
Aloe Soccotrina.
A. Hepatica.
A. Cabalina. L. E. D.
Aſia. Ind. Occ. Africa. Gum-reſin. Pil. gr. 5—20.
Pulv. Aloes cum Canella. L. gr. 8—20.
Pilulæ Aloeticæ. E. D.
Aloes compoſ. L. } gr. 10—20.
Aloes cum Colocynth. L. gr. 10—20.
Vinum Aloes Soccotrin. E. unc. 1—2.
Aloes. L. Aloetic. D. unc. $\frac{1}{2}$—1.
Tinctura Aloes Socotrin. E.
Aloes. L. } unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Dyſpepſ. Hypochondrias. Chloros.
Icter. Obſtipat.
Bryonia alba. E.
Bryonia. D.
Brit. Rad. Decoct. Pulv. ſcr. 1—2.
Maniam. Hydrop.
Convolvulus Jalapa. E.
Jalapium. L.
Jalapa. D.
Amer. Rad. Pulv. Bolus. gr. 15—30.
Pulvis Jalapæ compoſ. E. dr. $\frac{1}{2}$—1.
Extract. Rad. Convolvul. Jalapæ. E.
Jalapii. L. } gr. 5—12.
Tinctur. Convolvul. Jalapæ. E. dr. 3—6.
Jalapii. L. T. Jalapæ. dr. 2—4.
Conv. Scammonium. E.
Scammonium. L. D.
Aſia. Reſin. Pulv. Bol. Pil. gr. 5—15.
Pulvis Scammon. comp. L. gr. 8—15.
E. gr. 10—30.
cum Aloe. L. gr. 5—12.
Electuar. Scammonii. L. D. gr. 15—30.
Hydrop. Vermes.
Cucumis colocynthis. E.
Colocynthis. L. D.
Syria. Fructus medulla. Pil. Bol. gr. 2—5
Extract. Colocynth. comp. L. gr. 5—15.
Gratiola officinalis. E.
Gratiola. D.
Eur. mer. Herba. Radix. Decoct. Pulv. gr. 15—30.
Helleborus niger. E. D.
Melampodium.
Eur. mer. Rad. Pulv. Pil.

Extract.

Extract. Hellebor. nigri. E. gr. 3—6.
Hydrop.
Helleb. fœtidus.
Helleboraster. L.
Brit. Rad. Fol. Decoct.
Iris Pseudacorus.
Iris. D.
Brit. Rad. recens. Succ. express. gtt. 60—80
Hydrop.
Linum catharticum. D.
Brit. Herba. Infus. Pulv. dr. 1.
Momordica Elaterium. E.
Cucumis agrestis. L.
Brit. Fructus recens.
Succ. spiss. Momordic. Elater. E. / Elaterium. L. } gr. 1—3.
Hydrop.
Rhamnus Catharticus. E.
Spina cervina. L.
Brit. Bacca. Succ. express.
Syrupus Rhamni cathart. E. / spinæ cervinæ. L. } dr 6—12.
Hydrop.
Rheum palmatum. E.
Rhabarbarum. L. D.
Russia. Ind. Rad. Pulv. Bol. Pil. gr. 10—40.
Infusum Rhei palmati. E. unc. 1—3.
Vinum Rhei palmati. E. dr. 2—6.
Vinum Rhabarbari. L. unc. 1—2.
Tinctura Rhei palmat. E. / Rhabarbari. L. } unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Rhabarbari comp. L. unc. 1.
Rhei et Aloes. E. dr. 4—6.
Gentian. E. dr. 4—6.
Febres. Dysenter. Dyspeps. Hypochond. Icterum.
Ricinus communis. E. L. D.
Ind. Occ. Seminum Ol. express. dr. 3—unc. 1.
Stalagmitis Cambogioides. E.
Gambogia. L. D.
Ind. Gum-resin. Pil. g. 3—15.

Sect. III. Fossilia.

Sulphuretum Antimonii.
Tartris Antimonii gr. $\frac{1}{4}$. 4ta quaq. hor.
Dysenter.
Hydrargyrum.
Submurias Hydrargyri. gr. 1—4.
Submurias Hydrargyri præcipitat. E. / Hydrargyr. muriat. mitis. L. / Hydrarg. mur. mit. præcip. D. / Pilulæ Hydrargyri. E. D. L. } gr. 3—10.
Phlegmas. Comata. Colicam. Icterum.
Obstipat. &c.
Nitras Potassæ.
Sulphas Potassæ. E. / Kali vitriolatum. L. / Alkali vegetabile vitriolat. D. } dr. 1—2.
Murias Sodæ. E.
Natron muriatum. L.
Alkali fossile muriatum. D.
Brit. Solut. unc. $\frac{1}{2}$—1. Enem.
Sulphas Sodæ. E. / Natron vitriolatum. L. / Alkali fossile vitriolat. D. } unc. 1—2.
Sulphas Magnesiæ. E.
Magnesia vitriolat. L. D.
Brit. Solut. Enem. unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Dysenter. &c.

CLASS VI. EMMENAGOGA.

Sect. I. Animalia.

Murias Ammoniæ.
Carbonas Ammoniæ.
Castor Fiber. E.
Castor. L. D.
Russia. Amer. Mater. prope anum collecta.
Pulv. Pil. gr. 10—20. Enem. scr. 2—dr. 1.
Tinctura Castor. L. E. D. gtt. 20—dr. 1.
compos. E. gtt. 20—dr. 1.

Sect. II. Vegetabilia.

Anthemis nobilis. Pulv. Infus. fort.
Extract. Anthem. nobil. E. / Chamæmel. L. D. } gr. 15—30.
Ammoniacum. Pil. gr. 10—scr. 1.
Ferula Asa fœtida. Pil. gr. 10—20.
Pil. Asæ fœtid. comp. E. gr. 15—30.
Tinctur. Asæ fœtid. L. E. D. dr. 1—2.
Alcohol. Ammoniat. fœtid. E.
Spir. Ammoniæ fœtid. L. / Alkal. volatil. fœtid. D. } gtt. 30—dr. 1.
Marrubium vulgare. Infus.
Myrrha.
Pulvis Myrrh. comp. L. gr. 15—20.
Solanum Dulcamara.
Aloe perfoliata. Pil. gr. 1. ter in die.
Pulv. Aloes cum Myrrh. L. gr. 15—30.
Pil. Aloes cum Myrrh. L. gr. 8—15.
E. gr. 5—12.
cum Asa fœtida. E. gr. 10. bis in die.
Tinctura Aloes compos. L. unc. 1.
cum Myrrha. dr. 2—4.
Bryonia alba. Pulv. gr. 10—20.
Helleborus niger.
Tinctura Hellebor. nigr. E. dr. 1. bis in die.
Rheum palmatum. Pulv. gr. 5—10. bis in die.
Pilul. Rhei compos. scr. 1—dr. $\frac{1}{2}$.
Arnica montana. E. L.
German. Flores. Infus. scr. 1—2. in die.
Bubon Galbanum. E.
Galbanum. L. D.
Afric. Gum-resin. gr. 10—20.
Tinctura Galbani. L. dr. 1.
Pilul. Galbani compos. gr. 15—30.
Juniperus Sabina. E.
Sabina. L. D.
Asia. Fol. Pulv. gr. 10—15. bis in die.
Extract. Sabinæ compos. L. D. gr. 5—10. bis in die.
Tinct. Sabinæ. L. gtt. 40—60.
Pastinaca Opopanax. E.
Opopanax. L. D.
Eur. mer. Gum-resin. Pil.
Rosmarinus officinalis. E.
Rosmarinus. L. D.
Eur. mer. Summitat. Infus.
Rubia tinctorum. E.
Rubia. L. D.
Brit. Zealand. Rad. Pulv. dr. $\frac{1}{2}$—1. ter in die.
Ruta graveolens.
Ruta. L. D.
Eur. mer. Herba. Infus.
Extract. Rutæ. L. D.

Sagapenum. L. E. D.
Ægypt. Gum-refin. Pil.

SECT. III. FOSSILIA.

Hydrargyrum.
Submurias. Hydrargyri. gr. 3—5.
præcip. gr. 5—10.
Pilulæ Hydrargyr. gr. 10—20.
Ferrum. E. L. D.
Brit., &c.
*Carbonas Ferri. E.
Rubigo Ferri. L. D. } fcr. 1—dr. 1. bis in die.
Carbonas Ferri præcip. E. gr. 5—15.
Aqua Ferri Ærati. D. lib. $\frac{1}{2}$—1. in die.
Sulphas Ferri. E.
Ferrum vitriolat. L. D. } gr. 1—5. bis in die.
Vinum Ferri. L. dr. 2—4.
Tinctur. Muriatis Ferri. E.
Ferri muriat. L. D. } gtt. 10—20. bis terve in die.

* The quantity of carbonic acid in thefe two preparations, can fcarcely entitle them to the name of carbonate; they are rather carbonated oxyd, or what Dr. Thomfon calls oxy-carbonates.

CLASS VII. ERRHINA.

SECT. I. VEGETABILIA.

Afarum europæum. Pulv.
Pulvis Afari europ. compof. E.
Afari compof. L.
Nicotiana tabacum. Pulv.
Rofmarinus Officinalis. Pulv.
Iris florentina.
Iris. L.
Ital. Rad. Pulv.
Lavandula fpica. E.
Lavendula. L. D.
Eur. mer. Flores. Pulv.
Origanum majorana. E.
Majorana. L D.
Eur. mer. Folia. Pulv.
Teucrium marum.
Marum fyriacum. L.
Eur. mer. Herba. Pulv.
Veratrum album. E.
Helleborus albus. L. D.
Eur. mer. Rad. Pulv.

SECT. II. FOSSILIA.

Hydrargyrum.
Subfulphas Hydrarg. flav. E.
Hydrargyr. vitriolat. L. D. } gr. 1. bis in die.

CLASS VIII. SIALAGOGA.

SECT. I. VEGETABILIA.

Daphne Mezereum. Rad. mafticat.
Odontalg. Paralyf.
Amomum Zingiber. E.
Zingiber. L D.
Ind. Occ. Rad. mafticat. Infuf.
Odontalg.
Anthemis Pyrethrum. E.
Pyrethrum. L. D.
Eur mer. Rad. mafticat. Infuf.
Piftacia lentifcus. E.
Maftacia. L. D.
Eur. merid, Refina. Mafticat.

SECT. II. FOSSILIA.

Hydrargyrum.
Hydrargyrum purificatum.
Submurias Hydrargyri. gr. 1—2. bis in die.
Murias Hydrargyri. gr. $\frac{1}{8}$—$\frac{1}{4}$. bis terve in die.
Submurias Hydrarg. præcip. gr. 2. bis in die.
Pilulæ Hydrargyri. gr. 6—8. bis in die.
Oxidum Hydrargyri cinereum. E.
Pulvis Hydrargyri cinereus. D. } gr. 2. bis in die.
Unguentum Hydrargyr. E.
fcr. 4. fortius
L. D. fcr. 2. } alternis vel fingulis noctibus.
L. D. mitius.
Hydrargyr. calcinatum. L. gr. $\frac{1}{2}$. bis in die.
Acetis Hydrargyria. E.
Hydrargyr. acetatum. L. D. } gr. 2.
Hydrargyrus fulphurat. ruber. L. externe.
Sulphuretum Hydrargyri nigrum.
Hydrargyr. cum Sulphure. L.
Hydrargyr. fulphuratus niger. D.
Ad Febrem flav. Phrenit. Hydrocephalic. Ophthalm. Cynanch. tracheal. Hepatit. chronic. Comata. Tetanum. Hydrophob. Hydrop. Chloros. Siphilid. Lepr. Icterum. Pforam. Vermes.

CLASS IX. EMOLLIENTIA.

SECT. I. ANIMALIA.

Acipenfer Hufo. Sturio, &c. E.
Ichthyocolla. L. D.
Ruffia. Decoct. ad libit.
Ovis Aries. E.
Ovis fevum. L.
Sevum ovillum. D.
Brit. Ungt. Liniment. Cerat.
Phyfeter macrocephalus. E.
Sperma Ceti. L. D.
Sevum. Unguent., &c.
Sus fcrofa. E.
Adeps fuillum. L. D.
Brit. &c. Adeps. Unguent., &c.
Linimentum fimplex. E.
Unguentum Adipis fuillæ. L.
fimplex. E.
Unguentum fpermatis Ceti. L. D.
Ceræ. L. D.
Ceratum fimplex. E.
Spermatis Ceti. L. D.
Cera alba. et flava. E. L. D.
Brit. Emulf. Unguent., &c.
Ad Diarrhœam. Dyfenter. Ulcera.

SECT. II. VEGETABILIA.

Olea europæa. Liniment., &c. et interne.
Althea officinalis. E.
Althea. L. D.
Brit. Rad. Decoct. ad libit.
Decoct. Altheæ officinal. E. ad libit.
Syrupus Altheæ. E. L.
Amygdalus communis. E.
Amygdal. dulc. et amar. L. D.
Eur. mer. Fructus nucl. et Ol. expreff.

Emulfio Amygdali communis. E. } ad libit.
Lac. Amygdalæ. L. D.
Ad Febres. Pneumon Catarrh., &c.
Oleum Amygdali communis.
Aftragalus Tragacantha. E.
Gum Tragacantha L. D.
Eur. mer. Gummi. Pulv. Solut. ad libit.
Mucilago Aftragali Tragacanthæ. E.
Mucilag. Tragacanthæ. L.
Mucilag. Gum. Tragacanthæ. D.
Pulvis Tragacanthæ comp. L. dr. 1—4.
Avena fativa. E.
Avena. L. D.
Cult. Semen. Decoct. ad libit.
Febres. Pneumon. Catarrh. Dyfenter. Diarrhœa., &c.
Cocos Butyracea. E
Amer. merid. Oleum nucis fixum.
Externe.
Eryngium maritimum. E.
Eryngium. L. D.
Brit. Rad. recens.
Glycyrrhiza glabra. E.
Glycyrrhiza. L. D.
Eur. mer. Rad. Pulv. Decoct. Succ. fpiffat.
Trochifci Glycyrrhiz. E. L. D. ad libit.
Catarrh., &c.
Hordeum diftichon. E.
Hordeum. L. D.
Cult. Semen. Decoct. ad libit.
Ut Avena.
Decoctum Hordei diftichi. E. } ad libit.
compofit. L.
Lilium candidum.
Lilium album. D.
Cult. Rad. recens. Catapl.
Linum ufitatiffimum. E.
Linum. L.
Cult. Semen. Infuf. Ol. expreff.
Oleum Lini ufitatiff. E. unc. 1—3.
Lini. L. D.
Pneumon. Nephrit. Dyfenter. Hæmopt.
Malva fylveftris. E.
Malva. L. D.
Brit. Folia. Decoct.
Decoctum pro Enemate. L.
Meliffa officinalis. E.
Meliffa. L. D.
Cult. Herba. Infuf.
Mimofa nilotica. E.
Gummi Arabicum. L. D.
Arab. Senegal. Gum. Pulv. Solut. ad libit.
Mucilago Mimofæ niloticæ. E. } ad libit.
Arabici Gummi. L. D.
Emulfio Mimos. nilot. E.
Arabica. L. D.
Trochifci Gummofi. E.
Catarrh. Pneumon. Diarrh. Blenorrh.
Pyrus Cydonia. E.
Cydonia Malus. L.
Cult. Semen.
Mucilago Seminis Cydoniæ mali. L.
Sarcocolla.
Afia fucc. fpiffat.
Triticum hibernum. E.
Amylum. L.
Cult. Semen
Mucilago Amyli. E. D. } ad libit.
Trochifci Amyli. L.
Vitis vinifera. E.
Vitis. L. D.
Fruct. ficc. Uvæ paffæ.
Decoct. ab libit.

CLASS X. REFRIGERANTIA.

Sect. I. Vegetabilia.

Acidum Acetofum dilutum ad libit. extern.
Acetis Potaffæ. dr. 2. ad aq lib. 1. in die.
Aque Acetitis Ammoniæ, unc. $\frac{1}{2}$. freq.
Febres. Phlegmas.
Supertartris Potaffæ folut. ad libit.
Tamarindus Indica.
Fructus ad libit.
Febres.
Berberis vulgaris.
Berberis. D.
Brit. Fructus.
Febres.
Citrus medica. E.
Limonium. L. D.
Eur. mer. et Ind. Occ. Fruct. fucc. rec. et cryftall.
Syrup. Citri. medic.
Limonii. L. D.
Febres.
Citr. Aurantium. E.
Aurantia. L. D.
Eur. mer. Fruc. fucc. recens.
Cochlearia officinalis. E.
Cochlearia. D. C. hortens. L.
Brit. Herba. et fuccus.
Succ. Cochlear. comp. E. L. ad libit.
Ad Scorbutum.
Morus nigra.
Morus. L.
Cult. Fructus.
Syrupus Fruct. Mori. L.
Oxalis Acetofella.
Lujula. L.
Acetofella. D.
Brit. Herba. Succ.
Conferv. Acetofellæ. D.
Lujulæ. L.
Ribes nigrum. L. D.
Brit. Fruct.
Succ. fpiffat Rib. nigr. L.
Syrup. fucc. Rib. nigr. L.
Ribes rubrum. L. D.
Brit. Fructus.
Rofa canina. E.
Cynofbatus. L.
Brit. Fruct.
Conferva Rofæ caninæ. E.
Cynofbati. L.
Rubus Idæus. L. D.
Brit. Fructus.
Syrup. Fruct. Rub. Idæi. L. D.
Rumex Acetofa. E.
Acetofa. D.
Acet. pratenfis. L.
Brit. Folia.
Sifymbrium Nafturtium. E.
Nafturt. aquatic. L. D.

Brit.

Brit. Herba.
Ad Scorbutum.
Veronica. Beccabunga.
Beccabunga. L.
Brit. Herba.
Ad. Scorbutum.

Sect. II. Fossilia.

Zincum.
Sulphas Zinci. Externe pro Lotione.
Nitras Potaſſæ.
Acid. nitroſum. dr. 1—2. ad Aq. lib. 1. in die.
Febres, &c.
Spirit. ætheris nitroſi. L. E. } gtt. 30—dr. 1.
ætherειs nitroſ. D.
Trochiſci Nitrat. Potaſſ. E.
Nitri. L.
Febres. Phlegmas. Hæmorrh. Maniam.
Murias Sodæ.
Acidum Muriaticum. gtt. 20—40. dilut. ſubind.
Febres.
Acidum Sulphuricum. E.
Vitriolicum. L. D.
Acidum Sulphuric. dilutum. E. } ut Ac. Mur.
vitriolic. dilut. L. D.
Febres. Hæmorrhag.
Plumbum. E. L. D.
Acetis Plumbi. E.*
Ceruſſa Acetata. L. D.
Interne ad Hæmorrhag. ſed cautiſſime.
Aqua Lithargyr. acetati. L. } Externe.
Liquor Litharg. acetat. D.
Aqua Lithargyr. acetat. comp. L.
Liquor Litharg. acetat. comp. D.
Unguent. Acetit. Plumb. E.
Ceruſſ. acetat. L.
Cerat. Litharg. acetat. comp.
Ad Phlegmaſias, &c.

* It is now found that there are two acetates of lead, an acetate which cryſtallizes in ſcales, and this ſalt, which, containing an exceſs of acetic acid, ſhould be called ſuper-acetas plumbi.

CLASS XI. ASTRINGENTIA.

Sect. I. Vegetabilia.

Hæmatoxylum campechian. E.
Hæmatoxylum. L. D.
Americ. Lign. Decoct.
Extract. Lign. Hæmat. camp. E. } gr. 10—30.
Hæmatoxyl. L. D.
Juglans regia.
Juglans. L.
Brit. Fruct. immatur. Decoct. Externe.
Ulcera.
Kino. E. L. D.
Africa Pulv. Solut. gr. 15—30.
Tinct. Kino. E. D. dr. 1—2.
Diarrh. Dyſent. Menorrh.
Mimoſa Catechu. E.
Catechu. L. D.
India Extract. lign. Pulv. Solut. ſcr. 1—2.
Infuſ. Mimoſ. Catechu. E. unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Tinct. Mimoſ. Catechu. E. } dr. 1—3.
Catechu. L.
Elect. Catechu. E. } ſcr. 2—4.
Comp. D.
Diarrh. Dyſenter.
Anchuſa. Tinctoria. E.
Anchuſa. D.
Eur. Merid. Radix.
Boletus igniarius. E.
Agaricus.
Brit. ad. vulnera.
Pterocarpus Santolinum. E.
Santolinum rubrum. L. D.
India Lign.
Polygonum Biſtorta.
Biſtorta. L. D.
Brit. Rad. Pulv. dr. $\frac{1}{2}$—1. Decoct.
Potentilla reptans.
Pentaphyllum. L.
Brit. Fol.
Prunus Spinoſa.
Prun. ſylveſtris. L.
Brit. Fruct. ad libit.
Conſerv. Prun. ſylveſtris. L. dr. 1—3.
Diarrh.
Pterocarpus Draco. E.
Sanguis Draconis. L. D.
Amer. merid. Reſina.
Punica granatum.
Granatum. L.
Flor. Balauſt. D.
Eur. Merid. Flor. Cort. Fruct.
Decoct. ad Gargar. ad libit.
Quercus cerris. E.
Gallæ. L. D.
Aſia. Cyniphis nidus. Pulv. Inf. Ungt.
Quercus robur. E.
Quercus. L. D.
Brit. Cort. Decoct. Externe.
Scarlatin. Angin.—Uvulæ relaxat.
Hæmorrh. Menorrhag.
Roſa Gallica. E.
Roſ. Rubr. L. D.
Eur. Merid. Brit. Petal, Inf. Conſerv. ad libit.
Inf. Roſ. Gallic. E. } ad libit.
Roſæ. L.
Roſar. D.
Conſerv. Roſ. gallica E.
Roſæ. D.
Roſ. rubr. L.
Syrup. Roſ. Gall. E.
Mel. Roſ. L. D.
Hæmorrh. Cynanchen, &c.
Tormentilla erecta. E.
Tormentilla. L. D.
Brit. Rad. Decoct. unc. $\frac{1}{4}$—1.
Diarrhœa.

Sect. II. Fossilia.

Sulphas Cupri. gr. $\frac{1}{4}$—1. bis terve in die.
Febr. Intermitt.
Inject. Lot. Collyr.
Solut. Sulphat. Cupri. E.
Liquor Cupri Ammoniat. D.
Aq. Cupri. Ammon. L.
Ophthalm. Gonorrhœa.

Zincum.

Zincum.
Sulphas Zinci. gr. 2—5. bis terve in die.
Febres Intermitt.
Solutio Acetit. Zinci. Collyr. Injeƈt.
Aqua Zinci Vitriolat. cum Camphora. L.
Ophthalm. Blenorrh.
Ferrum.
Tinƈtura Muriat. Ferri. gtt. 10—20. ter in die.
Menorrhag. cum debilitate.
Plumbum.
Acetis Plumbi. Lotion.
Oxydum album et Semivitreum.
Super-Sulphas Alumin. et Potaſſ.
Sulphas Alumin. E.
Alumen. L. D.
Brit. Pulv. Solut. gr. 5—15.
Externe p. Gargar. et Lotione.
Sulphas Alumin. exſiccat. E.
Alumen uſtum. L.
Pulvis Sulphat. Alumin. comp. E. gr. 15—30.
Cataplaſm. Aluminis. L.
Ophthalm.
Aqua Alumin. comp. L. pro Lotione.

CLASS XII. TONICA.

Sect. I. Vegetabilia.

Anthemis Nobilis. Pulv. gr. 10—ſcr. 1. Infuſ. unc. $\frac{1}{2}$. ad lib. 1.
Centaurea benediƈta. Infuſ.
Marrubium Vulgare. Infuſ.
Myrrha. Pulv. Pil. gr. 10—20.
Pulv. Myrrh. Comp. gr. 20. ad 30.
Dorſtenia Contrajerva. Pulv.
Pulv. Contrajerv. Comp. L. gr. 20—30.
Vitis Vinifera.
Vinum rubrum Luſitanum.
Æſculus Hippocaſtanum. E.
Aſia. Brit. Cort. Pulv. dr. $\frac{1}{2}$—ſcr. 2.
Decoƈt. unc. 1. ad lib. 1.
Anguſtura. E. L. D.
Ind. Occident. Cort. Pulv. gr. 15—dr. $\frac{1}{2}$. Inf.
Chironea. Centaur. Gentian. Cent. E.
Centaur. Min. D.
Brit. Summitat. Infuſ.
Cinchona officinalis. E.
Cinchona. L.
Cort. Peruv. D.
Peru Cort. Pulv. dr. $\frac{1}{2}$—2. Eleƈtuar.
Enem. dr. 1—3.
Inf. Cinchon. Off. E.
Cort. Peruv. } unc. 2—4.
Decoƈt. Cinchon. Off.
Cort. Peruv. } unc. 3—6.
Tinƈt. Cinchon. Off. E. L. D. unc. $\frac{1}{2}$—1.
Comp. L. D. dr. 3—6.
Ammoniat. dr. $\frac{1}{2}$—1.
Extraƈt Cinchon. Off. E.
Cort. Peruv. L. D. } gr. 10—20.
Ad Febres. Rheumatiſm. Odontalg. Catarrh. Febril. Blenorrh. Dyſenter. Eryſipelat. Scarlatin. Hæmoptyſ. Menorrhag. Dyſpepſ. Hypochond. Aſtheniam. Spaſmoſ. Hydrop.
Cinchona Caribbæ.
Inſul. Caribb. Cort. (ut Cinchon. Off.)
Columba. L. E. D.
Ceylon. Africa. Rad. Pulv. gr. 5—20.
Inf. dr. 3. ad lib. 1.
Tinƈt. Columbæ. L. D. E.
Croton Eleutheria. E.
Caſcarilla. L. D.
Ind. Or. et Occident. Cort. Pulv. ſcr. 1—dr. 1.
Tinƈt. Caſcarill. L. D. dr. 2—6.
Extraƈt Caſcarill. L. D. gr. 10—20.
Gentiana lutæ. E.
Gentiana. L. D.
Eur. Merid. Rad.
Inf. Gentian. Comp. E. unc. $\frac{1}{2}$—1.
D. dr. 6—12.
L. unc. 2—4.
Tinƈt. Gentian. Comp. E. L. dr. 2—6.
Vin. Gent. Comp. E. unc. 1—2.
Extraƈt. Gent. L. D. lut. E. gr. 10—30.
Menyanthes Trifoliata. E.
Trifol. Paludos. L.
Brit. Rad. Exſiccat. Inf. unc. $\frac{1}{2}$—lib. 1.
Quaſſia Excelſa. E.
Quaſſia. L.
Inſul. Caribb. Lignum Cort. Rad. Inf. dr. $\frac{1}{2}$—2. ad lib 1.
Qu. Simaruba. E.
Simarouba. L. D.
Ind. Occ. Cortex. Decoƈt. dr. 2. ad lib. 1.
Salix fragilis.
Salix. D.
Brit. Cortex. Pulv. ſcr. 2—4.
Decoƈt. unc. 2. ad lib.
Swietenia Mahagani. E.
Ind. Occ. Cortex. Pulv. Decoƈt. ut Cinchona.
Sw. Febrifuga. E.
Ind. Occ. Cort. ut ſupra.
Tanacetum. vulgare.
Tanacetum. L. D.
Brit. Fol. Flor. Infuſ.
Ad Vermes.

Sect. II. Fossilia.

Sulphas Cupri. gr. 1—3. bis terve in die.
Febr. Intermitt.
Ammoniaretum Cupri. E.
Cuprum Ammoniatum. L. bis terve in die. } gr. $\frac{1}{2}$.
Pilulæ Ammoniar. Cupri. E. Pil. 1.
Epilepſ.
Zincum.
Sulphas. Zinci. gr. 2—5. bis terve in die.
Febr. Intermitt. Epilepſ.
Solutio Sulphat. Zinc. E.
Externe pro Collyrio.
Oxydum Zinci. E.
Zincum calcinatum. L.
Calx Zinci. D. } gr. 1. bis terve in die.
Epilepſ.
Nitras Potaſſæ.
Acidum Nitroſum. gtt. 30—40.
Sulphas Magneſiæ. Solut. dr. 2. bis in die.
Ferrum.
Carbonas Ferri ſcr. 1—dr. 1.
Præcip. gr. 5—15.
Aq. Ferri ærati. D. lib. $\frac{1}{2}$. bis in die.
Sulphas Ferri. gr. 1—5.
Vinum Ferri. dr. 2—6. bis in die.
Tinƈt. Muriat. Ferri. gt. 10—30. bis in die.
Sulphas Ferri exſiccat. E.
Oxydum Ferri rubrum. E.

Emplaſt.

Emplaft. Occid. Ferri rub. E.
Ferri limatura purific. E.
Oxydum Ferri nigr. purific. E.
Murias Ammon. et Ferri. E. } gr. 3—10.
Ferrum Ammoniacale. L.
Tinct. Ferri Ammoniac. L. gtt. 10—30.
Tartris Ferri et Potaffæ. E. } gr. 10—30.
Ferrum Tartarifatum. L.
Tinct. Ferri acetati. D. gtt. 20—40.
Dyfpepf. Hypochondrias. Afthen. Choream. Hydrop. Chloros. Phthis. Vermes.

Acidum Sulphuricum.
Acidum Sulphur. dilutum. gtt. 20—40.
Acidum Sulphuric. Aromaticum. E. gtt. 10—20. bis terve in die.
Dyfpepf. &c.

Argentum. L. E. D.
Nitras Argenti. E. } gr. $\frac{1}{8}$—$\frac{1}{4}$. bis in die.
Argentum Nitratum. L. D.

Arfenicum. Oxid. alb. vel Acid. Arfen.
Oxidum Arfenici. E.
Solut.

Carbonas Barytæ. E.
Vid. Sulphas Barytæ.

Carbonas Calcis. E.
Creta. L. D.
Brit. &c.
Solutio Muriatis Calcis. E. gt. 30—60. bis terve in die.
Ad Scrofulam, Schirrum, &c.

Sulphas Barytæ.
Terra ponderofa.
Brit.
Murias Barytæ. E.
Solutio Muriatis Barytæ. E. gt. 5—10. bis terve in die.
Ad Scrofulam, Schirrum, &c.

CLASS XIII. STIMULANTIA.

Sect. I. Animalia.

Murias Ammoniæ.
Aqua Ammoniæ. E. gt. 10—20. pur. L.
Liquor. alkal. volat. cauft. D.
Alcohol Ammoniatum. E. gt. 20—40.
Spiritus Ammoniæ. L.
Alkal. volat. D.
Carbonas Ammoniæ. E. gr. 5—10.
Ammonia præparata. L.
Alkali volatile mite. D.
Aqua Carbonat. Ammon. E. gt. 20—dr. 1.
Ammoniæ. L.
Liq. alkal. volatil. mit. D.
Liq. volat. Cornu Cervi. L. gt. 20—dr. 1.
Sal. Cornu Cervi. L. gr. 10—20.
Oleum Ammoniatum. E.
Liniment. Ammon. fort. L.
Liniment. Ammon. L.
Liniment. volatile. D.
Alcohol. Ammoniat. aromaticum. E. gt. 20—dr. 1.
Spir. Ammon. comp. L.
Alcoh. volat. arom. D.
Spir. Ammon. fuccin. L.
Afphyx. Spafmof. Rheumatifm, &c.

Mofchus mofchiferus.
Bol. Mist. gr. 10 fcr. 1.
Mistura Mofchata. unc. 1—2.
Ad Typhum. Gangraen.

Coccus Cacti. E.
Coccinella. L.
Mexico.

Lytta veficatoria.
Bol. gr. 1—3.
Tinct. Meloes veficat. gt. 10—30.
Ungt. Infuf. mel. veficat. E.
Cantharid. L. D.
Pulv. mel. veficat. E.
Ceratum. Cantharid. L.
Empl. melo. veficat. E.
Cantharidis. L. D.
mel. veficat. com. E.
Ad Synoch. Typh. Phrenit. Cynanch. Pneumon. Gaftrit. Enterit. Rheumatifm. Odontalg. Variol. Scarlatin. Apoplex. Paralyf. Choream. Afthm. Dyfpnœam. Pertuff. Colicam. Hyfteriam. Hydroph. Maniam. Icterum. Caligin. Amauros. Ifchuriam.

Sect. II. Vegetabilia.

Sinapis alba.
Semen et ejufd. Pulv. dr. 1—4.
Cataplafma Sinapeos. L. D.
Rheumatifm. Paralyf.

Allium fativum.
Rad. recens.

Arum maculatum.
Rad. recens. Bol. Elect. Emulf. gr. 10—20. bis in die.
Conferva Ari. L. dr. $\frac{1}{2}$—dr. 1.
Rheumatifm.

Pimpinella Anifum.
Semen.
Ol. volat. Pimpin. Anifi. gtt. 2—6.
Dyfpepf. &c.

Styrax Benzoin.
Balfamum.
Acidum Benzoicum. gr. 1—3.
Tinctura. Benzoes comp. L. gtt. 10—20.

Alcohol.
Æther Sulphuricus. dr. $\frac{1}{2}$—dr. 1.
Ad. Morb. fpafmod.
Æther Sulphuric. cum Alcohole. E.
Spiritus Ætheris vitriolici. L. } gtt. 15—30.
Liquor ætherus. vitriolicus. D.
Æther Sulphur. cum. Alcohol. comp. E. } gtt. 15—30.
Spir. æther. vitriol. comp. L.
Oleum Vini. L. gtt. 10—20.

Acidum Acetofum.
Acidum Acetofum forte. E.
Externe per nares in Syncope, Afphyxia, &c.
Acidum Acetofum Camphoratum. E.
Ut fupra.
Acetum Aromaticum. E.
Ut fupra.

Ariftolochia Serpentaria.
Rad. Pulv. Bol. fcr. 1—2.
Tinctura Ariftol. Serpentar. dr. 2—6.
Typh. Dyfpepf.

Daphne Mezereum.
Rad.
Decoctum Daph. Mezerei. unc. 1—2. fæp. in die.
Ad morbos. cutan. Syphil.

Guaiacum officinale.
Lign. Decoct. unc. 1. ad lib. 1. Refin. Pulv. Emulf. gr. 10—20.
Rheumatifm.

Rheumatifm. Syphil. Morb. cutan.
Decoctum Guaiac. officin. unc. 4—8. bis in die.
Tinctura Guaiac. offic. dr. 2—4.
ammoniat. dr. 1—3.
Papaver fomniferum.
Opium. gr. $\frac{1}{4}$—1. dos. repetit.
Tinctura Opii gtt. 5—20. fimili modo.
Camphorat. dr. 1—4.
Ammoniat. dr. $\frac{1}{2}$—1.
Typh. Dyfpepf. Tetan. &c.
Cochlearia Armoracia.
Rad. rec. Subft. Infuf.
Spirit Raphani comp. L. unc. 1—2.
Paralyf. &c.
Copaifera officinalis.
Balfam. gtt. 15—30.
Pinus. { Sylveftris. Larix.
Ol. vol. Pini puriff.
Ungt. Refin. flav. L. D.
Refinofum. E.
Cerat. Refin. flav. L.
Empl. Ceræ. D. comp. L.
Ungt. Picif. L. D.
Empl. Picif. Burgund.
Externe ad Ulcera. &c.
Arnica montana.
Rad. Pulv. fcr. 1—2.
Typh. Paralyf.
Bubon Galbanum.
Pilul. Galbani comp. gr. 15—20.
Emplaftrum Galbani comp. E.
Lithargyri compof. L.
Juniperus Sabina.
Oleum Juniper. Sabinæ, gt. 1—4.
Paftinaca Opoponax.
Pil. gr. 2—5.
Veratrum album.
Unguentum Hellebori albi. L.
Decoct. Hellebori albi. L.
Ad morb. cutan. L.
Amomum Zingiber.
Rad. Pulv. gr. 5—20.
Podagr. retroced. vel atonic. Paralyf. Dyfpepf. &c.
Syrupus Amom. Zingib.
Tinctura Amom. Zingib. E. dr. 2—4.
Acorus Calamus. E.
Calamus aromaticus. L.
Brit. Rad. Pulv.
Amomum repens. E.
Cardamomum minus. L. D.
India. Semen.
Tinctura Amomi repent. E. } dr. 2—4.
Cardamomi. L. D. }
comp. L. dr. 2—4.
Amyris Gileadenfis.
Afia. Refina.
Amyris Elemifera.
Elemi. L. D.
Amer. mer. Refina.
Unguentum Elemi. L.
Anethum Fœniculum. E.
Fœniculum. L. D.
Brit. Sem. Decoct. Enem.
Oleum volatil. Fœnicul. dulc. D.
Aqua Fœniculi dulcis. L. unc. 1—3.
Anethum graveolens.
Eur. Mer. Semen.
Aqua Anethi. L.
Angelica Archangelica. E.
Angelica. L. D.
Cult. Rad. Semen.
Apium Petrofelinum. E.
Petrofelinum. L.
Cult. Rad. Semen.
Arbutus Uva Urfi. E.
Uva Urfi. L. D.
Eur. Merid. Folia. Pulv. fcr. 1—dr. 1. Infuf.
Ad Calculum.
Artemifia maritima.
Abfinthium maritimum. L.
Brit. Cacumen.
Conferva Abfinthii maritimi. L.
Decoctum pro Fomento. L.
Canella alba. E. L. D.
India Occid. Cortex. Pulv.
Carbo Ligni.
Delphinium Staphifagria.
Staphifagria. L. D.
Eur. Mar. Sem. Pulv.
Capficum annuum.
Piper Indicum. L. D.
Ind. Occ. Capfulæ. Pulv. gr. 2—6. Infuf.
Ad Febres. Scarlatinam anginofam.
Carum Carui. E.
Carum. L.
Carui. D.
Cult. Semen. Decoct.
Oleum Carui. L. gtt. 1—4.
Spiritus Cari Carui. E. } unc. $\frac{1}{2}$—2.
Carui. L. D. }
Dyfpepf. Colic.
Ciftus Creticus.
Ladanum. L.
Syria. Refina.
Emplaftrum Ladani compof. L.
Citrus Aurantium.
Aurantium Hifpalenfe. L. D.
Eur. Merid. Flores. Cortex. Fruct. Infuf.
Oleum volat. Citri Auraut. E. gtt. 2—6.
Aqua Citri Aurantii. E. unc. 1—3.
Tinctura Aurantii Cort. L. D. unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Syrupus Citri Aurantii. E.
Cort. Aurantii. L. D.
Conferva Citri Aurantii. E.
Cort. Aurantii. L. D.
Coriandrum fativum. E.
Coriandrum. L. D.
Eur. Merid. Semen. Pulv. Infuf.
Crocus fativus. E.
Crocus. L. D.
Cult. Stigmata. Infuf.
Syrupus Croci. L.
Tinctura Croci. E. L. dr. 2—4.
Cuminum Cyminum.
Cuminum. L.
Ægypt. Sicil. Semen. Decoct.
Cataplafma Cumini. L.
Emplaftrum Cumini. L.
Curcuma longa.
Curcuma. L.
India Radix. Pulv.
Daucus Carota. E.
Daucus Sylveftris. L.

Brit. Semen. Radix. Cataplasm.
Dianthus Caryophyllus. E.
Caryophyllum rubrum. L. D.
Italia. Petala. Infus.
Syrupus Caryophylli rubri. L.
Eugenia caryophyllata. E.
Caryophyllum aromaticum. L. D.
Insul. Molucc. Floris germen.
Oleum volat. Caryophylli aromatici. gtt. 1—2.
Odontalg. Colic.
Hypericum perforatum.
Hypericum. L.
Brit. Flos.
Inula Helenium.
Enula campana. L. D.
Brit. Radix.
Juniperus Lycia. E.
Olibanum. L. D.
Asia. Gum-resin Pilul.
Kæmpferia rotunda. E.
Zedoaria. L.
India. Rad. Pulv.
Lavandula Spica. E.
Lavendula. L.
Lavandula. D.
Cult. Flores.
Oleum volat. Lavandulæ Spicæ. E.
Lavendulæ. L.
Spiritus Lavandulæ Spicæ. E.
Lavendulæ. L.
Spiritus Lavandulæ comp. E. }
Tinctura Lavendulæ comp. L. } dr. $\frac{1}{2}$—1.
Laurus Cinnamomum. E.
Cinnamomum. L. D.
Ceylon. Cortex. Pulv. gr. 5—15. Infus.
Ol. volat. Laur. Cinnamom. L. }
essent. Cinnamom. D. } gt. 1—2.
Aqua Laur. Cinnam. E. unc. 1—3.
Cinnamom. L. D.
Spir. Laur. Cinnamom. E. unc. $\frac{1}{2}$—1$\frac{1}{2}$.
Cinnamom. L. D.
Tinct. Laur. Cinnamon. E. dr. 2—4.
Cinnamom. L. D.
Cinnamom. comp. E. dr. 1—2.
Cinnam. comp. L. D.
Pulv. Aromaticus. L. E. D. gr. 10—20.
Electuar. Aromat. E. D. gr. 10—30.
Confect. Aromat. L.
Laurus Cassia. E.
Cassia lignea. D.
India. Cortex. Pulv. &c. Flor. nondum. explicit.
Aqua Lauri Cassiæ. E. unc. 2—4.
Laurus nobilis. E.
Laurus. L. D.
Cult. Folia. Bacc. et Oleum Bacc. Externe.
Lobelia syphilitica. E.
Virgin. Rad. Pulv.
Ad Siphilidem.
Melaleuca Leucodendron. E.
Cajeputa.
Insul. Molucc. Ol. essential. gtt. 1—4. et Externe.
Rheumatism.
Mentha viridis. E.
Mentha sativa. L. D.
Cult. Herba. Infus.
Oleum Menthæ sativæ. L. gtt. 2—6.
Aqua Menthæ sativæ. L. D. unc. 2—6.
Spiritus Menthæ sativæ. L. unc. 1—2.
Colic.
Mentha Piperita. E.
M. Piperitis. L. D.
Cult. Herba. Inf.
Aq. Menthæ piperitæ. E. unc. 1—4.
piperitidis. L. D.
Ol. volat. Menthæ piper. E. gt. 1—3.
essent. M. piperitid. L. D.
Spir. Menthæ piperit. E. dr. 2—6.
piperitid. L. D.
Mentha Pulegium. E.
Pulegium. L. D.
Cult. Herba. Infus.
Aq. Menth. Pulegii. E. unc. 2—4.
Pulegii. L. D.
Ol. volat. Menth. Puleg. E. gt. 1—3.
essent. Pulegii. L. D.
Spirit. Pulegii. L. unc. 1—2.
Myristica Moschata. E.
Myristica. L.
Nux Moschata. D.
Insul. Molucc. Nucleus. Pulv. Ol. volatil. et express.
gtt. 1—3.
Spiritus Myristic. Moschat. E. }
Nucis Moschatæ. L. D. } dr. 2—6.
Myroxylon Peruiferum. E.
Balsamum Peruvianum. L. D.
Amer. merid. Balsam. gtt. 10—30.
Tinctura Balsami Peruviani. dr. 1—2.
Myrtus Pimenta. E.
Pimento. L. D.
Jamaica. Bacca.
Aq. Myrti Piment. E. unc. 2—6.
Piment. L.
Ol. volat. Myrt. Pim. E. gt. 1—3.
Spir. Myrt. Piment. E. unc. 1—2.
Pimento. L. D.
Origanum vulgare. E.
Origanum. L. D.
Brit. Herba.
Oleum Origani. L.
Ad Odontalg.
Panax quinquefolium.
Ginseng. L.
China. Radix. Pulv.
Parietaria officinalis.
Parietaria. L.
Brit. Herba.
Pinus Balsamea. E.
Balsamum Canadense.
Americ. septent. Resina liquida.
Piper nigrum. E. L. D.
India. Fruct.
Piper Cubeba.
Cubeba. L.
Java. Fruct.
Pip. longum. E. L. D.
Fruct.
Pistacia Terebinthus.
Terebinthina Chio. L.
Insul. Chio. et Cyprus.
Rhus Toxicodendron. E.
Amer. Folia Pulv. gr. $\frac{1}{2}$—bis terve in die.
In Paralysin.
Styrax officinale. E.
Styrax. L. D.

Eur.

Eur. merid. Balfam.
Styrax purificata. L. D.
Toluifera Balfamum. E.
Balfamum Tolutanum. L. D.
Amer. merid. Balfam. Troch.
Tinctura Toluiferæ Balfam. E.
Syrupus Toluiferæ Balfam. E.
Tolutan. L.
Trigonella Fœnum græcum.
Fænum græcum. L.
Gallia Semen. Catapl. Fotus.
Urtica dioica.
Urtica. L.
Brit. Herb. rec. Externe. Pulv. fcr. 1—dr. 1.
Paralyf. Febr. Intermitt.
Wintera aromatica. E.
Amer. merid. Cortex. Pulv.

SECT. III. FOSSILIA.

Hydargyrum.
Vid. Sialagoga.
Ungt. Oxid. Hydr. rubr. E.
Nitrat. Hydrarg. E.
Hydrarg. nitrat. L.
Un. nitrat. Hydrarg. mitius. E.
Nitras Potaffæ.
Acidum nitrofum. dr. 1—in die.
Unguentum Acidi nitrofi. E.
Ad. morb. cutan.
Sapo Hifpanus.
Tinctura Saponis. E.
Linimentum Saponis compof. L.
Saponaceum. D.
Rheumatifm, &c.
Tinctura Saponis cum Opio. E.
Ceratum Saponis. L. D.
Emplaftrum Saponis. L.
Saponaceum. E. D.
Murias Sodæ.
Murias Sodæ exficcatus. E.
Externe in Afphyx.
Acidum Sulphuricum.
Externe in Ungt. ad morb. cutan. et interne.
Oxidum Arfenici.
Externe in Carcinom.
Bitumen Petroleum. E.
Petroleum. L.
India.
Oleum Petrolei.
Sub-boras Sodæ. E.
Boras Sodæ. E.
Borax. L. D.
India. Pulv. Linctus.
Ad Aphthas.
Sub-acetis Cupri. E.
Ærugo. L. D.
Collyr. Ungt.
Oxymel. Æruginis. L.
Unguentum Sub-acetit. Cupri. E.
Calx. E.
Calx viva. L. D.
Linimentum Aquæ Calcis. E.
Ad Tineam Capitis.
Nitras argenti.
Externe pro efcharchio.

CLASS XIV. ANTISPASMODICA.

SECT. I. ANIMALIA.

Murias Ammoniæ.
Vid. Stimulantia.
Mofchus mofchiferus.
Pulv. Bol. fcr. 1—dr. $\frac{1}{2}$.
Cervus Elaphus.
Ol. Animal. L. } gtt. 15—30.
Cornu Cervin. rectificat. D. } gtt. 15—30.
Caftor Fiber. Pulv.
Tinctur. Caftor. gtt. 30—dr. 1.
compof. gtt. 20—40.
Ad Hyfteriam, &c.

SECT. II. VEGETABILIA.

Cephælis Ipecacuanha.
Pulv. gr. 3—6.
Nicotiana Tabacum.
Fum.
Colic.
Ferula Afa fœtida.
Pilul. gr. 10—fcr. 1.
Alcohol Ammoniat. fœtid. E. } gtt. 15—30.
Spiritus Ammoniæ fœtid. L. } gtt. 15—30.
Spt. Alkali. volatil. fœtid. D. } gtt. 15—30.
Pilulæ Afæ fœtid. comp. E.
Emplaftr. Afæ fœtid. E.
Hyfteria, &c.
Alcohol.
Æther Sulphuricus. dr. $\frac{1}{2}$—2.
Laurus Camphora.
Emulfio Camphorata, unc. 2—3.
Miftura Camphorata, unc. 2—3.
Tinctura Camphoræ. E.
Spirit. Camphoratus. L. D. Externe.
Liniment. Camphor. com. L.
Camphorat. D.
Papaver fomniferum.
Opium. Pil. Mift. gr. 1.
Liniment. Enem.
Tinct. Opii.
camphorat. L. dr. 1—4.
ammoniata. E. dr. 1.
Elect. Opiatum. gr. 5.
Pilul. Opii. L.
Opiatæ. gr. 10.
Bubon Galbanum.
Pilul.
Tinctura Galbani. L. dr. 1—2.
Pilul. Galbani comp. L. gr. 15—40.
Hyfteria.
Vitis vinifera.
Vinum rubrum Lufitanum. lb. 1—in die.
Ad Tetanum.
Citrus Aurantium.
Fol. Pulv. dr. $\frac{1}{2}$.
Convulf.
Artemifia Abfinthium.
Abfinthium vulgare. L.
Brit. Cacumen. Oleum. volat.
Carbonas Potaffæ impurus. E.
Cineres clavellati. L. D.
Aqua Potaffæ. E.
Kali puri. L.

Lixivium alkali vegetab. cauft. D.
Externe in Balneo ad Tetanum.
Cardamine pratenfis. E.
Cardamine. L.
Brit. Flores. Pulv. dr. ½. bis in die.
Ad Choream, &c.
Conium maculatum. E.
Cicuta. L. D.
Brit. Folia. Pulv. gr. 1.
Succus fpiffat. Conii maculat. E.
Extract. Cicutæ. L. D.
Fuligo Ligni Combufti. D.
Hyfter.
Hyofcyamus niger. E.
Hyofcyamus. D.
Brit. Folia. Semen.
Succus fpiffat. Hyofcyam. nigri. E. gr. 2—4.
Valeriana officinalis. E.
Valeriana. L. D.
Brit. Radix. Pulv. fcr. 1—dr. 1. bis terve in die.
Tinctura Valerianæ. L. dr. 2—4.
Ammoniat. E. dr. 1.
Extract. Valerian. fylveftr. refinos. D.
Ad Hyfteriam, &c.

SECT. III. FOSSILIA.

Hydrargyrum.
Vid. Sialagoga.
Bitumen Petroleum. E.
Petroleum. L. D.
Italia.
Oleum Petrolei. L.
Succinum. L. E. D.
Oleum Succini. E.
puriffimum. E. } gtt. 10—20.
rectificat. L. D. }
Sal Succini. D.
Spiritus Ammoniæ. fuccinat. L. gtt. 30.

CLASS XV. NARCOTICA.

VEGETABILIA.

Nicotiana Tabacum.
Vinum Nicot. Tabaci. E. gt. 30. dr. 1. bis in die.
Aconitum neomontanum.
Succus fpiffat. Aconit. napel. gr. ½—2.
Papaver fomniferum.
Tinct. Opii. gt. 25.
Camphorat. dr. 2—6.
Syrup. Opii. D.
Extr. Papaver. fomnifer. E.
Pulv. Opiat. L. E. gr. 10.
Elect. Opiatum. E. gr. 43.
Confect. Opiata. L. gr. 36.
Pil. Opii. E. gr. 5.
Opiatæ. E. gr. 10.
Ad Febr. intermittent. Typh. Rheumatifm. Odontalg. Catarrh. Dyfenter. Ophthalm. Enterit. Scarlatin. Variol. Rubeol. Hæmoptyf. Menorrhag. Hæmorrh. Tetan. Choream. Epilepf. Pertuff. Afthmat. Hydrophob. Angin. pectoris. Hyfteriam. Phthis. Icter. Diabet.
Rhododendron Chryfanthum.
Folia. Vid. Diaphoretica.
Digitalis purpurea.
Pulv. gr. 1.
Tinctura Digital. purpur. gtt. 10.
Ad. Synocham. Phrenit. idiopath. et Hydrocephalic. Pneumon. Phthifin, &c.
Arnica montana.
Flores. Pulv. gr. 5.
Paralyf. Convulf. Amauros.
Rhus Toxicodendron.
Folia. Vid. Stimulantia.
Conium maculatum.
Pil. Pulv. gr. 1.
Succus fpiffat. Conii maculat. gr. 2.
Hyofcyamus niger.
Succus fpiffat. Hyofcyam. nigr. gr. 2—4.
Tinctura Hyofcyami nigr. E. dr. 1.
Atropa Belladonna. L. D.
Belladonna. L. D.
Brit. Fol. Pulv. gr. 1.
Datura Stramonium. E.
Brit. Fol. Pulv. gr. 1.
Humulus Lupulus *.

* We have inferted the hop among the articles of the Materia Medica, as it probably would have been received by the Edinburgh college, had their Pharmacopeia been publifhed fome months later. Within the laft year it has been frequently employed in the Edinburgh infirmary as a fubftitute for opium with great fuccefs, as it was found to produce fleep in cafes where opium was ineffectual or inadmiffible. It is ufually adminiftered in the form of a faturated tincture.—Vid. De Roches' "Differt. Inaug. de Humulo Lupulo. Edin. 1803."
Dr. Spens has adopted it in his edition of the Infirmary Pharmacopeia, and has given a formula of it under the title of "Pilulæ Humuli lupuli."

Cult. Conus. Pulv. Pil. gr. 3.
Lactuca virofa. E.
Brit. Folia. Succ. fpiffat. gr. 1.
Ad Hydrop.
Papaver Rhœas. E.
Papaver erraticum. L.
Brit. Petala. Infuf.
Syrupus Papaver. errat. L.
Sium nodiflorum.
Sium. L.
Brit. Herba.

CLASS XVI. ANTHELMINTICA.

SECT. I. ANIMALIA.

Murias Ammoniæ.
Aqua Carbonatis Ammoniæ.
Emulf.

SECT. II. VEGETABILIA.

Anthemis nobilis.
Pulv. fcr. 1—dr. ½. bis in die.
Lumbric.
Nicotiana Tabacum.
Enema.
Afcarid.
Olea Europea.
Oleum. Enema Emulf.
Allium fativum.
Rad. recens. Subft. ad libitum.
Ferula Afa fœtida.

Gum.

Gum. Refin. Enema. fcr. 1—2.
Convolvulus Jalapa.
Rad. Pulv. gr. 10—30.
Convolvulus Scammonium.
Pulv.
Pulvis Scammonii compofitus.
Helleborus fœtidus.
Fol. Succ. expreff.
Lumbric.
Rheum palmatum.
Pulv. gr. 5—10. omni nocte.
Ricinus communis.
Oleum expreff. unc. ½—1. Enem. unc. 1—2.
Stalagmitis Cambogioides.
Pil. gr. 5—15.
Ad Tæniam.
Ruta graveolens.
Infuf. Enema.
Oleum volat. Rutæ. gtt. 3—6.
Juglans regia.
Cortex Fructus immatur. Extract.
Tanacetum vulgare.
Flor. Pulv. fcr. 1—2.
Valeriana officinalis.
Rad. Pulv. dr. 1.
Artemifia. Santonica. E.
Santonicum. L. D.
Afia. Semen. Pulv. dr. ½—fcr. 2. bis in die.
Dolichos pruriens. E.
Ind. Occ. Pubes leguminum. Elect. gr. 10—30.
Geoffrœa inermis. E.
Jamaica. Cortex. Decoct. Syrup.
Decoctum Geoffr. inerm. E. unc. 1—2. omni mane.
Polypodium Filix mas. E.
Filix. L.
Filix mas. D.
Brit. Rad. Pulv. dr. 2—3.
Ad Tæniam.
Spigelia marilandica. E.
Amer. Rad. Pulv. gr. 10—fcr. 2.

SECT. III. FOSSILIA.

Hydrargyrum.
Amalgama Stanni.
Submurias Hydrargyri. gr. 3—10.
Murias Sodæ.
Pulv. dr. ½—unc. 1.
Ferrum.
Carbonas Ferri. gr. 10—30.
Sulphas Ferri gr. 3—10.
Ferri limatura purificat. dr. ½—1.
Tartris Ferri et Potaffæ. gr. 10—fcr. 1.
Calx. E.
Calx viva. L.
Calx recens ufta. D.
Aqua Calcis. L. E. D. Enema. lib. ½—1.
Ad Afcarid.
Stannum. L. E. D.
Stanni Pulvis. L. unc. ½—1.
Ad Tæniam, et Lumbric.

CLASS XVII. ABSORBENTIA.

SECT. I. ANIMALIA.

Cervus Elaphus.
Phofphas Calcis. E. } gr. 10—20. bis in die.
Cornu Cervi uftum ppt. L. } gr. 10—20. bis in die.
Ad Rachit.
Cancer Aftagus et Pagurus. E.
Cancris oculi vel Chelæ. L.
Brit. Lapil. et Chelæ. Pulv.
Chelæ. Cancr. ppt. L. dr. ½—1.
Pulv. e Chel. Cancr. Comp. L. fcr. 1—2.
Ad Diarrhœam, &c.
Murias Ammoniæ.
Aq. Ammoniæ. gtt. 10—15.
Carbonas Ammoniæ. gr. 5—15.
Aq. Carbonatis Ammon. gtt. 20—40.
Sal. Cornu Cervi. gr. 5—12.
Ad Cardialg. &c.
Ifis nobilis. E.
Corallium. L.
Corallium rubrum præpar. L.
Oftrea edulis. E.
Oftrea edulis. E.
Oftreæ Tefteæ. L.
Brit. Teftæ Pulv.
Teftæ Oftr. præpar. L.
Spongia officinalis. E.
Spongia. L.
Spongia ufta. L. fcr. 1—2.
Ad Scroful.

SECT. II. VEGETABILIA.

Carbonas Potaffæ impurus.
Aqua Potaffæ.
Potaffa. E. Externe.
Kali purum. L.
Alkali vegetabile cauft. D.
Potaffa cum Calce. E.
Calx cum Kali puro. L.
Caufticum mitius. D.
Carbonas Potaffæ. E. gr. 10.
Kali præparatum. L.
Alkali vegetabile mite.
Carbonas Potaff. puriff. E. gr. 10.
Aqua Carbonat Potaff. gt. 30.
Kali. L.
Lixivium mite. D.
Aqua fuper-carbonat. Potaff. E. unc. 4. fæp. in die.
Liquor Alkal. veget. mitiff. D.
Ad Cardialg. Calculum, &c.

SECT. III. FOSSILIA.

Sulphur fublimatum.
Sulphuretum Potaffæ. E. } gr. 10.
Kali fulphuratum. L. } gr. 10.
Alkali vegetabile fulphurat. D. } gr. 10.
Ad Venena metallica.
Hydrofulphuretum Ammoniæ. E. gtt. 5—10.
Ad Diabetem.
Sulphas Magnefiæ.
Carbonas Magnefiæ. dr. ½.
Magnefia Alba. L. D.
Magnefia. E. fcr. 1—dr. 1.
Magnefia Ufta. L. D.
Trochifci Magnefiæ. L. ad libit.
Ad Cardialgiam.
Calx.
Aqua Calcis. E. L. D.
Ad Dyfpepf.
Bolus Gallicus. L.
Pulv.

Ad

Ad Diarrhœam, &c.
Carbonas Calcis. E.
Creta. L. D.
Carbonas Calcis præparat. E. gr. 15—dr. 1.
Creta præparata. L. D.
Pulv. Carbonat. Calc. com. E. gr. 15—30.
Cretæ composit. L.
Trochisc. Carbonat. Cretæ. E. ad. libit.
Cretæ. L.
Potio Carbonat. Calcis. unc. 2—3.
Mistura Cretacea. L.
Aqua Æris fixi. D. lib. ½—in die.
Ad Cardialgiam. Calculum.
Carbonas Sodæ impurus. E.
Natron. L.
Alkali fossile mite. D.
Carbonas Sodæ. E. } gr. 10—30.
Natron præparatum. L. }
Aqua super-carbonatis Sodæ. E. lib. ½—1. in die.
Ad Calculum, &c.
Carbonas Zinci impurus. E.
Lapis Calaminaris. L. D.
Brit. Ung. et Collyr.
Oxydum Zinci impurum. E.
Tutia. L. D.
Brit. Ung. et. Collyr.

For an account of the medical properties and use of the several classes, in the preceding table, see EMETICS, EXPECTORANTS, &c. &c.

MATERIA *Subtilis*, denotes a fine subtile matter, which the Cartesians suppose to pervade and penetrate freely the pores of all bodies, and to fill up all the pores so as not to leave the least vacuity, or interstice, between them. See CARTESIANS.

This machine they have recourse to, to support the doctrine of an absolute plenum, and to make it consistent with the phenomena of motion, &c. and, accordingly, they make it act and move at pleasure, but in vain: for were there any such matter, in order for it to be able to fill up the vacuities of other bodies, it must, itself, be entirely void of any, *i. e.* it must be perfectly solid, vastly more solid than gold, and, therefore, more ponderous, and resist vastly more, which is inconsistent with phenomena. See VACUUM, and PLENUM.

Yet sir Isaac Newton allows of the existence of a subtile matter, or medium, much finer than air, penetrating the closest bodies, and contributing to the production of many of the phenomena of nature. The existence of such a matter he argues from the experiment of two thermometers, which being inclosed in glass vessels, "one of them, exhausted of its air, and both carried from a cold to a warm place, the thermometer *in vacuo* grows warm, and rises, almost as soon as that in the air; and, if returned into the cold place, both cool and fall about the same. Hence, says he, is not the heat of the warm room conveyed through the vacuum by the vibrations of a much subtiler medium than air, which remained *in vacuo* after the exhaustion of the air? And is not this medium the same whereby light is refracted, reflected, &c.?" See ÆTHER.

MATERIAL denotes something composed of *matter*. In which sense the word stands opposed to *immaterial*. The Epicureans, Spinosists, &c. own no other but material substances. (See SUBSTANCE.) Among causes, some are material, others are formal. See CAUSE.

Material causes, having no understanding or liberty, must always act in the same manner, when under the same circumstances. Philosophers and divines dispute, whether or no there be any material forms really distinct from matter? (See FORM.) The Valentinians formerly applied the term materia. to all people but those of their own sect; asserting that their souls perished with their bodies. Thus also the Stoics maintained, that none but the souls of their wise men survived the body.

MATERIAL *Circle*. See CIRCLE.

MATERIAL *Object*. See OBJECT.

MATERIALISTS, a sect in the ancient church, composed of persons, who, being prepossessed with that maxim in the ancient philosophy, *Ex nihilo nihil fit*, *Out of nothing nothing can arise*, had recourse to an internal matter, on which they supposed God wrought in the creation; instead of admitting God alone as the sole cause of the existence of all things.

Tertullian vigorously opposes the doctrine of the Materialists, in his treatise against Hermogenes, who was one of their number.

Materialists is also a name given to those who maintain that the soul of man is material; or that the principle of perception and thought is not a substance distinct from the body, but the result of corporeal organization. (See SOUL.) There are others, called by this name, who have maintained that there is nothing but matter in the universe; and that the Deity himself is material. See SPINOSISM.

MATESHOLM, in *Geography*, a small island in the North sea, near the coast of Lapland. N. lat. 68° 8'.

MATGAR, a town of Hindoostan, in the circar of Kotta; 15 miles S S.W. of Kotta.

MATHA, a town of France, in the department of the Lower Charente, and chief place of a canton, in the district of St. Jean d'Angely; 14 miles N.W. of Saintes. The place contains 714, and the canton 14,940 inhabitants, on a territory of 295 kiliometres, in 26 communes.

MATHAN, a town of Africa, in the kingdom of Bornou, called a royal city. N. lat. 18° 30'. E. long. 21° 40'.

MATHANON PORT, a port in the S.E. part of the island of Cuba, between Cape Cruz and Cape Maizi, which affords good anchorage for ships.

MATHEMATICAL POINT. See POINT.

MATHEMATICAL *Sect*, in the *History of Learning*, is one of the two leading philosophical sects, which appeared towards the beginning of the seventeenth century: this sect directed its researches by the principles of Gassendi, and sought after truth by observation and experience. The disciples of this sect denied the possibility of erecting on the basis of metaphysical and abstract truths, a regular and solid system of philosophy, without the aid of assiduous observation and repeated experiments, which are the most natural and effectual means of philosophical progress and improvement. The advancement and reputation of this sect, and of natural knowledge in general, were much owing to the plan of philosophizing, proposed by lord Bacon, to the establishment of the Royal Society in London, to the genius and industry of Mr. Boyle, and to the unparallelled researches and discoveries of sir Isaac Newton. Barrow, Wallis, Locke, and many others, were of this sect. See CORPUSCULAR, EXPERIMENTAL, and NEWTONIAN *Philosophy*.

The other sect of philosophers was the metaphysical.

MATHEMATICS is that science which treats of the ratio and comparison of quantities, and is therefore defined the *science of ratios*; some writers call it the *science of quantities*, but this is inaccurate, since it is not quantities themselves which are the subject of mathematical investigation, but the ratio that such quantities bear to each other.

The

MATHEMATICS.

The term mathematics is derived from μαθησις, *matheſis*, diſcipline, ſcience, repreſenting with juſtneſs and preciſion the high idea that we ought to form of this branch of human knowledge. In fact, mathematics are a methodical concatenation of principles, reaſonings, and concluſions, always accompanied by certainty, as the truth is always evident, an advantage that particularly characteriſes accurate knowledge and the true ſciences, with which we muſt be careful not to aſſociate metaphyſical notions, conjectures, nor even the ſtrongeſt probabilities.

The ſubjects of mathematics are the compariſons of magnitude, as numbers, velocity, diſtance, &c. Thus, geometry conſiders the relative magnitude and extenſion of bodies; aſtronomy, the relative velocities and diſtances of the planets; mechanics, the relative powers and force of different machines, &c. &c. ſome determinate quantity being fixed upon in all caſes as a ſtandard of meaſure.

Mathematics are naturally divided into two claſſes; the one comprehending what we call *pure* and *abſtract;* and the other the *compound* or *mixed*. *Pure* mathematics relate to magnitudes generally, ſimply, and abſtractedly, and are therefore founded on the elementary ideas of quantity. Under this claſs are included *arithmetic*, or the art of computation; *geometry*, or the ſcience of menſuration and compariſon of extenſions of every kind; *analyſis*, or the compariſon of magnitudes in general; to which we may add *geometrical analyſis*, which is a combination of the two latter. *Mixed* mathematics are certain parts of phyſics, which are, by their nature, ſuſceptible of being ſubmitted to mathematical inveſtigation. We here borrow from inconteſtible experiments, or otherwiſe ſuppoſe bodies to poſſeſs ſome principal and neceſſary quality, and then, by a methodical and demonſtrative chain of reaſoning, deduce from the principles eſtabliſhed concluſions as evident and certain as thoſe which pure mathematics draw immediately from axioms and definitions, obſerving, that theſe reſults are always given with reference to the experiments on which they are founded, or the hypotheſis which furniſhed the firſt datum. Let us illuſtrate this by an example. Numberleſs experiments have ſhewn us, that all bodies near the earth's ſurface fall with an accelerated velocity, and that the ſpaces paſſed through are as the ſquares of the times they have been in falling. This, then, the mathematician conſiders as a neceſſary and eſſential quality of matter, and with this datum he proceeds to examine what will be the velocity of a body after any given time, in what time it will have acquired a given velocity, what time is neceſſary for it to have generated a given ſpace, &c. and in all theſe inveſtigations his concluſions are as certain and indiſputable as any of thoſe which geometry deduces from ſelf-evident truths and definitions. Again in optics, having eſtabliſhed it as a principle of light, that it is tranſmitted in right lines while no obſtacle is oppoſed to the paſſage of the rays; that when they become reflected, the angle of incidence is equal to the angle of reflection; that in paſſing from one medium to another, of different denſity, they fly off from their firſt direction, but ſtill follow a certain geometrical law; theſe principles, or qualities of light, being once admitted, whatever may be its nature, be it material, or be it immaterial, or whatever may be the medium through which it paſſes, or the ſurface by which it is reflected, are totally matters of indifference to the mathematician; he conſiders the rays only as right lines, the ſurfaces on which they impinge as geometrical planes, of which the form only enters into his inveſtigation: and from this point all his enquiries are purely geometrical, his inveſtigation clear and perſpicuous, his deduction evident and ſatisfactory. To this claſs of mathematics belong *mechanics*, or the ſcience of equilibrium and motion of ſolid bodies; *hydrodynamics*, in which the equilibrium and motion of fluids are conſidered; *aſtronomy*, which relates to the motion, maſſes, diſtance, and denſities, of the heavenly bodies; *optics*, or the theory and effects of light; and, laſtly, *acouſtics*, or theory of ſounds.

Such are the ſubjects that fall under the contemplation of the mathematician, and as far as a knowledge of theſe may be conſidered beneficial to mankind, ſo far, at leaſt, the utility of the ſcience on which they depend muſt be admitted. It is not, however, the application of mathematics to the various purpoſes of ſociety, that conſtitutes their particular excellency; it is their operation upon the mind, the vigour they impart to our intellectual faculties, and the diſcipline which they impoſe upon our wandering reaſon. "The mathematics," ſays Dr. Barrow, "effectually exerciſe, not vainly delude, nor vexatiouſly torment ſtudious minds, with obſcure ſubtilties, but plainly demonſtrate every thing within their reach, draw certain concluſions, inſtruct by profitable rules, and unfold pleaſant queſtions. Theſe diſciplines alſo inure and corroborate the mind to a conſtant diligence in ſtudy; they wholly deliver us from a credulous ſimplicity, and moſt ſtrongly fortify us againſt the vanity of ſcepticiſm; they effectually reſtrain us from a raſh preſumption, moſt eaſily incline us to a due aſſent, and perfectly ſubject us to the government of right reaſon. While the mind is abſtracted and elevated from ſenſible matter, it diſtinctly views pure forms, conceives the beauty of ideas, and inveſtigates the harmony of proportions; the manners themſelves are ſenſibly corrected and improved, the affections compoſed and rectified, the fancy calmed and ſettled, and the underſtanding raiſed and excited to more divine contemplations."

Many of our readers will probably not be diſpoſed to admit, to the full extent, the juſtneſs of Dr. Barrow's panegyric; they may think he has over-rated the value of mathematical acquiſition, and that ſome of his aſſertions are founded in ſelf-ſufficiency and pride. But thoſe who form the latter opinion, muſt be unacquainted with the true character of this celebrated author; and thoſe who entertain the former, are not probably initiated into the myſteries of theſe ſciences; and, therefore, are not competent judges of their value. We are aware, that mathematics have had calumniators, as well as eulogiſts; it has even been repreſented as a ſcience which blunts all the tender feelings of our nature; that it renders its profeſſors vain, arrogant, and preſumptuous; as deſtroying all reliſh for works of taſte and imagination; hardening the heart againſt every truth, but thoſe of the demonſtrative kind; and, conſequently, as having a tendency to lead us into infidelity and atheiſm.

The celebrated author of the Rambler indulged ſome of theſe notions. It was, he obſerved, "the great praiſe of Socrates, that he drew the wits of Greece, by his inſtruction and example, from the vain purſuits of natural philoſophy to moral enquiries; and turned their thoughts from ſtars and tides, and matter and motion, to the various modifications of virtue, and relations of life." He purſues this thought ſtill farther, and illuſtrates it by a ſtory which he tells of one Gelidus, a mathematician, who was ſo abſorbed in his ſpeculations, that when his ſervants came to acquaint him that a houſe was on fire, and the whole neighbourhood in danger of being burnt, he only replied, that it was very likely, for it was the nature of fire to act in a circle. He even diveſts this pſeudo-philoſopher of the common feelings of humanity, and makes him as inſenſible to the wants of

his

his family, as to the diftreffes of his neighbours. But fuch illiberal notions are a difgrace to their author, and fhew a narrownefs of mind, that one would not expect to have found affociated with fo much talent. "A great and comprehenfive genius excludes none of the fciences, they all contribute, by various means, to adorn and embellifh life; and for this reafon ought to be cultivated and improved. Happy is the mind that is not contracted by the ftudy of philofophy, nor enervated by the charms of the belles lettres; that can be ftrengthened by Locke, inftructed by Clarke and Newton; impaffioned by Cicero and Demofthenes; and elevated by the powers of Homer and Virgil." Bonnycaftle's Aftronomy.

That fome mathematicians may have been vain and prefumptuous, perhaps cannot be denied; but many, and thefe amongft the moft eminent, have been equally diftinguifhed for their modefty and unaffuming manners, of which our Newton furnifhes an illuftrious example. Admitting, therefore, that the charge is juft with refpect to certain individuals, unlefs it can be fhewn (and which we believe it cannot) that it applies to a greater proportion of the profeffors of this fcience than of any other, the injuftice of the accufation, as applied to the fcience itfelf, is evident. What fcience, or what fubject can be named, in which the fame charge will not apply to individuals; even that which above all might be fuppofed to have the greateft influence in checking thofe paffions, the great founder of which was a pattern of humility, meeknefs, and peace; even this facred caufe has been but too frequently difgraced by the bigotry and intolerance of its profeffors. The next objection to thefe purfuits is, that they deftroy all relifh for works of tafte, and that genius is unneceffary, and only great labour required, in order to attain the firft rank in the fciences. To this we will let Boffut reply: "Is it," fays the philofopher, "at all aftonifhing, that the ignorant and fuperficial many fhould confound the fruits of that knowledge, which is acquired by ftudy, with thofe new and original truths to which genius alone can give birth? To be juft, we muft weigh the great mathematicians of well eftablifhed reputation againft the great poets and great orators. Thus on the one fide, let us place Homer, Virgil, Racine, Pope, Demofthenes, Cicero, and Boffuet; and on the other, Archimedes, Hipparchus, Galileo, Defcartes, Huygens, Leibnitz, and Newton; and it will not then be fo eafily determined to which fide the balance, in point of genius, ought to incline." We might purfue this fubject to a much greater length, and enter into a formal defence of the other charges brought againft mathematics and mathematicians; but they may be all anfwered in a word. Their greateft calumniators, amongft whom we place Jofeph Scaliger, the abbé Desfontaines, and our countryman Hobbes, were men who coveted fame, and thought themfelves competent to acquire it in every branch of human knowledge; they, therefore, attempted the moft difficult problems, and their little knowledge of the fubject led them into errors which made them the ridicule of all fcientific men; thus exafperated and difappointed, they became the enemies of that fcience in which they had before fo vainly defired to fhine; and reproached it merely to gratify their pride and revenge.

The hiftory, illuftration, and application of the feveral branches of mathematics, have been treated of under their refpective heads in the prefent work; and it therefore only remains for us, in the prefent article, to give a brief fketch of the moft prominent parts of the hiftory of the whole, in order to trace their progrefs and mutual dependence, which are loft in the detached accounts. With this view of the fubject, we fhall nowhere enter into particulars, but where thefe are required, reference will be made to the feveral articles in which fuch information may be obtained. Neither fhall we offer any fpeculations concerning the origin of thefe fciences, which is rather calculated to amufe than to inftruct; but proceed at once to real hiftorical facts, obferving only, with regard to the Egyptians, that they undoubtedly poffeffed fome knowledge of geometry and aftronomy before thefe fciences were tranfplanted into Greece; but as we are totally unacquainted with the extent of their knowledge, all records of it having been loft or deftroyed, it will be fafeft to advance nothing on this head, and to begin our fketch with the earlieft authentic traces of it amongft the ancient Greeks.

It is generally fuppofed, that the Greeks derived their firft knowledge of the fciences from the magi of Egypt, and it was probably known in the former country long before the time of Thales, who is commonly ftiled the father of Grecian philofophy, only becaufe he is the firft of whom any decided account has been tranfmitted to us. Herodotus informs us, that Thales predicted a total eclipfe of the fun, and though no date is mentioned by this celebrated hiftorian, yet aftronomers have now afcertained that the only total eclipfe, (and it could be no other than total, from the circumftances attending it,) happened in the year 610 before Chrift. See Phil. Tranf. for 1810, in which is given an elaborate paper on this fubject, by F. Bailly, efq. At this period, therefore, it is obvious that aftronomy was confiderably advanced in Greece, as the prediction of an eclipfe is far from being an elementary problem; it neceffarily requires a vaft number of delicate obfervations, which could only be obtained after a long feries of years. Pythagoras, who is fuppofed to have been a pupil of Thales, and who flourifhed about the year 590 B.C., is the next of thofe celebrated Grecians whofe names are rendered immortal by their great and important difcoveries. This philofopher, it appears, made confiderable improvements in arithmetic, aftronomy, and geometry; in arithmetic he is faid to have invented the multiplication table, or the *abacus Pythagoricus;* in aftronomy, he fuggefted the idea of the true fyftem, placing the fun in the centre, and making the planets revolve about him; and in geometry he difcovered the 47th propofition of Euclid's firft book, which alone would have been fufficient to have ranked him with the firft of geometricians. At this period flourifhed Anaximander, and foon after Anaximenes, Anaxagoras, and Cleoftratus; thefe were all eminent in aftronomy and philofophy. Œnopidus, 480 B.C., was a learned geometer, author of feveral problems, and his contemporary Zenodorus is the firft of the ancients whofe works have been handed down to us; all before his time having been loft or deftroyed. About this time alfo flourifhed Hippocrates of Chios, who diftinguifhed himfelf by the celebrated quadrature of the lunes which bear his name, as well as by his difcoveries connected with the problem of *doubling the cube*, which excited great intereft amongft the ancient mathematicians of this period. (See DUPLICATION *of the Cube.*) This difcovery revived fome hopes of obtaining the required folution, but it foon appeared that the difficulty was merely changed, and not in the leaft diminifhed, and that it ftill prefented obftacles that were infurmountable. This did not, however, difcourage other mathematicians from following up the purfuit; and feveral curious geometrical properties were the refult of thefe inveftigations; the *conchoid* of Nicomedes, the *ciffoid* of Diocles, and the *quadratrix* of Dinoftratus, owe their origin to the fame fource.

Paffing over fome mathematicians and aftronomers of lefs note,

note, we come to Plato, who cultivated both aſtronomy and geometry with great aſſiduity, about 390 years B.C. The celebrated inſcription that he cauſed to be placed over the door of his ſchool, "Let no one enter here who is ignorant of geometry," is a proof of the high eſtimation in which he held the latter ſcience. To this philoſopher we owe the introduction of the conic ſections into geometry, and his diſciple Ariſteus is ſaid to have compoſed five books on theſe curves, of which the ancients have ſpoken with the greateſt commendations, but unfortunately they have not been tranſmitted down to our time. Beſides Ariſteus, Plato numbered amongſt his friends, or ſcholars, Eudoxus, Menechmus, and Dinoſtratus; the former of whom was very celebrated for his extenſive knowledge in aſtronomy and geometry; Menechmus, for his application of the conic ſections to various problems; and the latter for the invention of the *quadratrix*, as applicable to the problem of doubling the cube, which ſeems to have been the germ of what is now termed the geometrical analyſis.

It was about 90 years from the time of Plato to that of Euclid, during which period all the ſciences were conſiderably advanced and extended, and treatiſes on particular ſubjects appeared from time to time, in which all the propoſitions then known were collected and arranged in ſyſtematic order, which was the object of Euclid in his celebrated Elements, a work which has met with a ſucceſs incomparably ſurpaſſing that of any other book of ſcience that ever was publiſhed, having been taught excluſively for ſeveral centuries in every place of mathematical inſtruction, and is therefore too well known to need any particular deſcription. We are now arrived at that period when the Grecian ſciences were in their meridian ſplendour; Archimedes, one of the greateſt geometers that ever appeared in any age or country, followed ſoon after the time of Euclid. His univerſal genius led him to the contemplation of almoſt every ſpecies of human knowledge, and nearly every branch of mathematical ſcience is indebted to him for his numerous and important diſcoveries. Arithmetic, geometry, mechanics, optics, hydrodynamics, were alike the objects of his inveſtigation, and experienced alike the powerful effects of his ſuperior talents. We cannot in this place enter into a particular deſcription of theſe diſcoveries, and muſt therefore refer our readers to the article ARCHIMEDES, in which an abſtract of the moſt important of them will be found. After Archimedes, at the diſtance of about fifty years, another celebrated geometrician, Apollonius, cultivated the mathematical ſciences with the greateſt poſſible ſucceſs, for the particulars of whoſe diſcoveries and writings we muſt refer to the article APOLLONIUS. This period, as we before obſerved, (B.C. 250) was the moſt brilliant era of ancient geometry, for after theſe great men we meet with no other mathematician of the firſt order, yet there were ſeveral who cultivated both geometry and aſtronomy, and which nothing but the confined limits of this article would juſtify us in paſſing over in ſilence; ſuch, for inſtance, as Eratoſthenes, who firſt attempted to meaſure the circumference of the earth; Cteſibius, to whom we are indebted for the uſeful invention of water pumps; Hero of Alexandria, who was much celebrated for his application of geometry to the practical purpoſes of menſuration, and to whom we are indebted for the invention of clepſydræ, or water clocks. We might alſo enumerate many other eminent mathematicians and aſtronomers, but as we are under the neceſſity of limiting our obſervations to thoſe who are moſt pre-eminently diſtinguiſhed, we ſhall paſs at once to Hipparchus, the prince and father of aſtronomy, who flouriſhed about 142 B.C. To him we are indebted for the firſt effectual claſſification of the ſtars; for aſcertaining nearly the duration of the year; the diſcovery of what he called the *excentricity* of the ſolar orbit; the *preceſſion of the equinoxes*; and various other important diſcoveries and obſervations: beſides which Hipparchus had the merit of applying this ſcience to the purpoſes of geography; he reduced to certain and invariable principles the method of determining the ſituation of places on the earth, by means of their latitudes and longitudes, of which, however, ſome notions were entertained as early as the time of Alexander. The next mathematician of eminence was Theodoſius, who wrote an excellent work on the ſphere, which may be conſidered as an introduction to ſpherical trigonometry; and though many of the author's propoſitions are almoſt ſelf-evident, yet faithful to the views of the ancients, he has ſubmitted them all to the moſt rigorons demonſtrations, a taſk which he has performed with the greateſt elegance. After this author, we proceed for three or four hundred years without meeting with any geometrician who is much diſtinguiſhed for his diſcoveries or improvements. The ſciences had been for a long time in a declining ſtate, in the ſchool of Alexandria, when the celebrated Ptolemy began, in ſome meaſure, to revive them, at leaſt aſtronomy, by reducing all the parts of it into more order and conſiſtency, A.D. 140. His principal work, the "Almageſt," (a word derived from the Arabic, ſignifying *the great collection*,) contains all the ancient obſervations and theories, to which his own reſearches being added, he may be ſaid to have formed of the whole the moſt complete collection of ancient aſtronomy that ever appeared; a work which ſupplies, in ſome meaſure, the place of thoſe that preceded it, and for the compilation of which its author will be ever entitled to the gratitude of aſtronomers. It was ſome years after this period, (though the exact time has never yet been aſcertained,) that Diophantus, a celebrated mathematician alſo of the Alexandrian ſchool, made a new and remarkable ſtep in arithmetic, by the invention of the indeterminate analyſis; a ſpecies of algebra, and which is the firſt trace we have of this extenſive branch of mathematics. The work conſiſted of 13 books, of which however only ſix have ever reached us, unleſs a ſeventh, which is found in ſome editions of Diophantus, be his work, which is conſidered as doubtful. This treatiſe diſplays great talents and originality, and has ever been held in the greateſt eſteem by analyſts of all ages, and has accordingly been commented upon and explained by various writers, both ancient and modern, but moſt of thoſe of the former are loſt. Of theſe we regret the commentary of the celebrated Hypatia, daughter of Theon, who flouriſhed about the year 410 of the Chriſtian era. The talents, virtues, and misfortunes, of this illuſtrious victim of fanaticiſm, have a claim to the homage of poſterity, while the remembrance of the deed, and the perpetrators of it, will as deſervedly be execrated and abhorred by every friend of ſcience and admirer of female virtue. (See HYPATIA.) What was the diſtance of time between Diophantus and Theon is not diſtinctly known, it was however barren of any diſtinguiſhed authors. About this period we meet with Pappus and Diocles, the latter of whom has been already mentioned in ſpeaking of the duplication of the cube, and the former alſo made ſome ingenious advances, both with regard to this problem, and that of the triſection of an angle; but what he is more particularly diſtinguiſhed for, is his collections of the various works of his predeceſſors; theſe collections contain one of the moſt valuable monuments of ancient geometry: in them he has aſſembled together a number of excellent works, almoſt all of which are now loſt, and to them he has added ſeveral new, curious, and learned propoſitions propofitions of his own; an interefting account of which is given under the article Pappus in Dr. Hutton's "Mathematical Dictionary:" fee alfo the fame article in the prefent work. After Pappus we meet with Eutocius, A.D. 520, who was himfelf a great mathematician; and whofe commentaries on the works of Archimedes and Apollonius in particular are much efteemed. To the names already mentioned may be added thofe of Proclus, Marinus, and Hero *the younger;* to the former we are indebted for his commentary on fome of the books of Euclid, but more for the kindnefs, attention, and protection, which he afforded to thofe who purfued thofe ftudies in his time. Marinus and Ifidorus, his contemporaries, are celebrated for their architectural fkill, and to them it is faid we are indebted for the invention of domes; and Hero, who is furnamed the younger, to diftinguifh him from the learned author of the fame name *of Alexandria*, is equally celebrated as an engineer, and for his rule for finding the area of a triangle when the three fides only are given.

We are now arrived at that period fo fatal to the fciences. Thefe had for a long time taken refuge in the mufeum of Alexandria; where, deftitute of fupport and encouragement, they could not fail to degenerate. Still, however, they preferved, at leaft by tradition, or imitation, that ancient and ftrict character which had been impreffed upon them by the Greeks; but about the middle of the feventh century, a tremendous ftorm arofe, which threatened their total deftruction. Filled with all the enthufiafm a militant religion infpires, the fucceffors of Mohammed ravaged that vaft extent of country which ftretches from the eaft to the fouthern confines of Europe. All the cultivators of the arts and fciences, who from every natinn had affembled in Alexandria, were driven away with ignominy; fome fell beneath the fwords of the conquerors; others fled into remote countries, to drag out the remainder of their lives in obfcurity and diftrefs. The places and the inftruments which had been fo ufeful in making an immenfe number of aftronomical obfervations, were involved with the records in one common ruin. The whole of that precious library which contained the works of fo many eminent authors, and was the common depofitary of every fpecies of human knowledge, was entirely devoted to the flames by the Arabs; the caliph Omar obferving, that if they agreed with the koran they were ufelefs, and if they did not, they ought to be deftroyed; a fentiment worthy of fuch a leader, and of the caufe in which he was engaged.

Here followed feveral ages of the moft wretched barbarifm and ignorance, fo that it is even wonderful that the fciences fhould ever again have recovered this deadly blow; but as we before obferved, fome of the philofophers of Alexandria efcaped the vengeance of their barbarous conquerors, and thefe of courfe carried with them fome remnant of that general learning, for which this fchool was fo defervedly celebrated. Still, however, deftitute of books, of inftruments, and probably alfo of the means of exiftence without manual labour, very little farther knowledge could be accumulated, and ftill lefs propagated, fo that in a few years every fpecies of knowledge connected with philofophy and mathematics muft have become extinct, had not the Arabians themfelves, within lefs than two centuries from this fatal cataftrophe, become the admirers and fupports of thofe very fciences which they had before fo nearly annihilated. They ftudied the works of the Greeks with the greateft affiduity, and if they added little to the ftock of knowledge which thefe works contained, they became fufficient mafters of many of the fubjects to enable them to comment upon them, and to fet a due value upon thefe precious relics of ancient fcience; by which means they have been preferved, and handed down to the moderns. Of all the branches of mathematics, aftronomy was that which the Arabs held in the greateft eftimation, at the fame time however they did not totally neglect the other branches. Our prefent fyftem of arithmetic is derived from thefe people, though it does not appear that they were the inventors, but had acquired their knowledge of it from the Indians. Geometry alfo, and particularly trigonometry, owe much to the improvements of the Arabs. Mohammed Ben Mufa, and Geber Ben Alpha, who lived about the eleventh century, are both well known for their fcientific works. Amongft the Arabian princes and aftronomers, the moft celebrated are, Almanfor, who flourifhed about the year 754; Al. Maimon, who reigned from 813 to 833, in whofe time, in confequence of the great fupport and affiftance which he afforded to the fciences, we find them making very confiderable progrefs; Alfragan, Thebit Ibn Chora, and Albategni, were particularly diftinguifhed about this period. Thebit was an algebraift, geometrician, and aftronomer; Alfragan compofed elements of the latter fciences, of which feveral editions have been publifhed fince the invention of printing; and Albategni, in confequence of his numerous and important obfervations, and accurate knowledge, was furnamed the Arabian Ptolemy. The works of this author have been collected in one quarto volume, entitled "De Scientia Stellarum," of which there are two editions, one publifhed in 1537, and the other in 1646. We cannot here enumerate all the Arabian aftronomers and mathematicians who diftinguifhed themfelves for feveral centuries, an extenfive lift of whom, with their refpective works, is given by Montucla in his valuable Hiftory of Mathematics; we muft not however pafs over Alhazen, a very celebrated Arab, who fettled in Spain about the year 1100, and to whom we are indebted for a treatife on optics, and for the firft theory of refraction and twilight.

About this time the mathematical fcience began to be propagated in feveral European countries. So early as the year 1202, an Italian merchant, Leonardus de Pifa, had compofed a treatife on algebra, in which he fucceeded in the folution of equations of the third degree, and thofe of higher dimenfions, in certain cafes, where they would allow of reduction. Jordanus Nemorarius was another eminent author in his time (A.D. 1230); he wrote on arithmetic, geometry, and the planifphere; but his contemporary, John of Hallifax, commonly Sacrobofco, was much better known. This latter author was an Englifhman, but went and refided as profeffor of mathematics at Paris. We have a treatife of his on the fphere; which has been commented on by Clavius, the jefuit, and reprinted a great number of times; he likewife left us a treatife on the aftrolabe, on the calendar, and on the arithmetic of the Arabs. In 1250, Campanus Novara tranflated and commented on Euclid's Elements, and wrote a treatife on the fphere, and another on the theory of the planets, the object of which was to explain the ancient aftronomy, and the corrections introduced by the Arabs. We have another work of the fame period on optics, by Thomas Pecam, who from a fimple obfervantine monk became archbifhop of Canterbury; this treatife has been feveral times reprinted, and was long confidered as a claffical work. The fciences at this time found a zealous patron in the great emperor Frederic II., even amid the continual wars he had to fuftain againft the pope. This prince afcended the throne in 1219, and died in 1250 during, which period he founded the univerfity of Naples.

Another

Another celebrated philosopher of this period was Roger Bacon, an Englishman, who was born in 1214, and whose numerous works have been repeatedly reprinted. His treatise on optics is considered a very masterly performance for the time in which it was written. It has even been asserted, that he understood the use of spectacles, and was the inventor of gunpowder; but in fact neither of these discoveries can be properly attributed to him, though, with regard to the latter, he was certainly upon the verge of it, but he did not thoroughly explain it, nor was this done for many years after. Bacon was persecuted by the monks, being accused by them of magic, and was on this charge thrown into a dungeon, from which he was not liberated, till he had fully convinced his superiors, and the pope, *that he was no magician, nor had ever held any correspondence with the devil.* With regard to the invention of spectacles, it was not made till after the death of Bacon, by Alexander Spina, a Jacobin friar, who died in 1313.

The 14th century produced few scientific men of eminence; but some of those who, though they did not advance this subject, prevented it from being lost, deserve to be mentioned. Of these we may enumerate Peter of Albano, who wrote a treatise on the astrolabe; and Cecchi Ascoli, professor of mathematics at Bologna, who composed a commentary on the sphere of Sacrobosco, which was several times reprinted. Both these men acquired the reputation of sorcerers and heretics, in consequence of which the former was burnt in effigy, and the latter in person, in the year 1328, at the age of seventy. In Germany, John of Saxony, an Augustine friar, wrote on the Alphonsine tables, and on eclipses, and Henry of Hesse, professor at the newly founded university of Vienna, treated on the theory of the planets; but these works were never printed. We might mention some other names, as John de Muris, author of a system of music, and an astronomical work; John de Lignières, also an astronomer at Amiens, and a few others; but their works being now wholly forgotten, it would answer no purpose to lengthen this article, and fatigue the reader with uninteresting details. Some progress, however, was made in mechanics during this century; wheeled clocks were constructed, which exhibited, besides the hours, several of the planetary motions; paper-mills were invented or improved, and the useful article paper began to get into common use.

The 15th century, to which we are now arrived, was much more fruitful in men of science and genius than any we have met with since the time of the ancient Greeks. Amongst those who cultivated geometry and algebra at this time, is principally to be distinguished Lucas Paccioli, or Lucas de Burgo, who was a Franciscan monk, and flourished towards the end of this century. He composed several works, translated Euclid into Latin, to which he added some learned annotations; he also published a work entitled "Summa de Arithmetica Geometria, &c." in which we find the common rules in arithmetic, the rule of false position, and the resolution of simple and quadratic equations; we are likewise indebted to him for two other works, one entitled "De Divina," and the other on the regular bodies.

Astronomy also made considerable progress in this age. Its first benefactor was John Gmunden of Vienna, and Peter Dailli, who, in 1414, proposed to the council of Constance a reformation of the calendar, which was become very incorrect. The cardinal Nicholas de Cusa ought also to be particularly distinguished for his persevering through fruitless attempts to revive the Pythagorean system. To these may be added Purbach, and his pupil Regiomontanus, who were two of the greatest promoters of astronomy at this period. They observed the heavens together at Vienna for ten years, and after the death of Purbach, his pupil took a journey to Rome to learn the Greek language with more facility, in order that he might read the other Greek works; Ptolemy having been before his principal resource. Here his progress was very rapid; for in a short time he translated into Latin the Conics of Apollonius, the Cylindrics of Serenus, the mechanical questions of Aristotle, the Pneumatics of Hero, all the works of Ptolemy, &c. Besides these labours, he was author of several excellent works of his own, particularly one on trigonometry; he was also employed by pope Sixtus IV. in the reformation of the calendar, but died before it was completed, in 1476. In France, James Lefevre cultivated the mathematics with success, rendering them considerable service by his translations and other performances. In Italy, John Bianchini constructed astronomical tables, much esteemed in their time; James Angelo, a Florentine, translated Ptolemy's geography; and Dominic Maria Novera of Bologna initiated Copernicus into astronomy. In Germany, John Engel, a Bavarian, published ephemerides of celestial motions, and proposed a scheme for reforming the calendar. In Spain, Ferdinand of Cordova commented upon Ptolemy's Almagest, and Bernard of Granolachi published also ephemerides in 1488, and calculated as far as 1550. In this century also, the properties of the magnet began to be better understood; some considerable voyages were undertaken and successfully performed; sea-charts were invented by Henry duke of Visco; new lands and continents were discovered; in short, every thing seemed to promise a rapid progress in the cultivation of the sciences.

Early in the 16th century, we meet with several distinguished analysts and geometricians. Of these Cardan is perhaps the best known, though some of his contemporaries equally distinguished themselves: such was Tartaglia, the author of the solution of cubic equations, which is commonly, though falsely, ascribed to Cardan. (See IRREDUCIBLE *Case.*) A pupil of Cardan, Lewis Ferrari, also distinguished himself by his solution of biquadratic equations; the same was also done by Bombelli of Bologna, who likewise made several other important improvements and discoveries; amongst the rest, shewing that the two branches of the common expression for the root of a cubic equation of the irreducible case was a real quantity, and thus removing what had been before considered as an unaccountable paradox. We ought also to mention Maurolicus, a Sicilian abbot, who discovered a method of summing several series, as for instance series of squares, cubes, &c., as also the triangular and other figurate numbers. But during this century, no one has greater claim for his analytical discoveries than Vieta; to whom we owe a very important improvement in the algebraical notation. Before his time no solution of any but numerical equations had ever been attempted; the unknown quantity was represented by some letter or symbol, and all the other quantities were absolute numbers, and all particular rules were expressed in words at length as in arithmetic: but Vieta, by introducing letters as representatives of quantities, whether known or unknown, gave a generalization to the algorithm of this science, which is now one of its most important characteristics. To the same celebrated author we are indebted for the theory of angular sections, a branch of analytical trigonometry, which has been so fruitful in the hands of the Bernouillis and Euler; as we are also for the first general

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idea of applying algebra to the folution of geometrical problems, an invention which is falfely afcribed to Defcartes. What is given above relates principally to analyfis, but geometry alfo made fome progrefs during the fame period, though no very important difcoveries were made in this fcience, except fo far as that which relates to the angular fections of Vieta above-mentioned; however, Tartaglia, Maurolicus, Commandin, and Ramus may be confidered as poffeffing a refpectable knowledge of this fubject, and as having by their works and tranflations rendered it confiderable fervice: befides thefe, we may mention Peter Metius, Hadrianus Romanus, and Ludolphus van Ceulen, each of them authors of different methods of approximation with regard to the ratio of the circumference to the diameter of the circle; the latter of whom, in particular, carried it to 36 places of decimals. Aftronomy alfo was confiderably advanced during this century; Copernicus very early in it made, or at leaft attempted to make, that important reformation of placing the fun in the centre of the fyftem, according to the ancient or Pythagorean doctrine, though his work "De Revolutionibus," in which it is contained, was not completely finifhed till the year 1543, the author dying on the very day on which he received the firft complete copy. This fyftem, which is now fo univerfally confided in, fo fimple in its mechanifm, fo conformable to all celeftial appearances, and fo worthy of the great and omnipotent architect, was, through the ignorance and fuperftition of a few contemptible bigots, declared to be heretical. To affert the mobility of the earth, or the fallibility of the pope, were confidered as crimes of the blackeft dye, and were accordingly vifited with the moft *ingenious* torture of the Inquifition; fortunately, however, for the caufe of truth, and the fciences, this inftitution has long fince been difarmed of its terror, and the true fyftem of aftronomy is now fupported upon a bafis, which no inquifitorial power will ever be able to deftroy. Of thofe who moft contributed to fupport the Copernican fyftem, muft be particularly diftinguifhed the celebrated Galileo, whofe important difcoveries in various branches of aftronomy, mechanics, and philofophy, are too numerous to admit of a minute detail in this place; we muft therefore refer the reader for particulars to the article GALILEO. We fhall, however, for the fake of connection, mention his difcovery of the law of falling bodies, and his invention, or at leaft important improvement in the ufe of the telefcope; whereby he firft difcovered the fatellites of Jupiter. Tycho Brahe, the Danifh aftronomer, alfo flourifhed about this time, and is defervedly celebrated for his numerous and accurate celeftial obfervations, which, aided by thofe made by himfelf, furnifhed Kepler with fufficient data to inveftigate the planetary motions, and finally led to the eftablifhment of thofe laws that bear his name; and which may be confidered as the firft ftep towards the true theory of phyfical aftronomy. See KEPLER's *Laws*.

Such was the ftate of the fciences at the commencement of the 17th century, when a moft important difcovery was made by baron Napier, of Merchefton, in Scotland, who in 1614 publifhed his "Logarithmorum Canonis Defcriptio, &c." a work which entitles its author to a rank amongft the firft-rate mathematicians. Previoufly to the invention of logarithms, all trigonometrical and aftronomical calculations were attended with immenfe labour, in confequence of the numerous operations in multiplication and divifion which entered into them, at the fame time that the refults were neceffarily attended with lefs certainty. But by this happy invention, all the moft tedious cafes were rendered extremely eafy, and confequently great facility given to aftronomical and trigonometrical computations. It was not, however, in the firft inftance, fo well calculated for general practice as the fyftem in prefent ufe; for which we are indebted to Henry Briggs, profeffor of mathematics in the univerfity of Oxford, who laboured with the greateft poffible zeal to bring them into their prefent ftate. We fhall not in this place enter into any defcription of the nature of thefe numbers, as this is already done under the article LOGARITHMS: it will therefore be fufficient for our purpofe to name thofe who, at this period, moft diftinguifhed themfelves in the advancement of this department of fcience; fuch were Gellibrand, Gunther, and Vlacq, all friends or pupils of Briggs: and to thefe we may add Juftus Byrge, a German, who printed a table conftructed according to the inverfe order of our common tables of logarithms. Inftead of confidering the numbers relative to the geometrical progreffion as the principal numbers, to which the logarithms ought to be fubordinate, he, on the contrary, confidered the logarithms as the principals, to which he made thofe depending on the geometrical progreffion correfpond. But this fyftem met with very little fuccefs, being in no refpect calculated for common ufe, in confequence of the immenfe tables which it required.

About this period, 1620, Harriot, a well-known Englifh analyft, enriched algebra by feveral important improvements, who firft fubftituted fmall letters inftead of the capitals ufed by Vieta; and proved that every equation has as many roots as there are units in the index of the higheft power, and that all equations may be confidered as produced by the multiplication of equations of the firft order. Defcartes alfo fhewed the method of expreffing curve lines by means of equations, and of diftributing them into different claffes, according to the different order of thefe equations. We are alfo indebted to the fame author for a method of drawing tangents, maximum et minimum, the theory of curves of double curvature, &c. problems which do their author more fubftantial honour than his more lofty, but hypothetical theory of vortices, and other of his philofophical fpeculations, which latter, however, are not materially connected with the prefent fubject. Fermat alfo contributed largely at this period to the improvement of analyfis, particularly in what relates to the Diophantine problems, and the theory of numbers; the latter of which branches may be faid to date its origin from this time: many elegant numerical theorems were difcovered by this author, moft of which were left without demonftration, and fome of them ftill remain to exercife the talents of the ableft analyfts of the prefent day. Several other mathematicians might here alfo be mentioned, who contributed to the advancement of the fciences at this period, but the limits of our article will not admit of fuch an enumeration; we muft not, however, pafs over Cavalerius, who firft left the beaten path of the ancients, and treated geometry in a manner totally different from what they had done, and thus facilitated the operations in a variety of difficult problems; but at the fame time it muft not be denied, that it wanted the accuracy and certainty which characterized the ancient method. His work, which contained the doctrine of Indivifibles, was publifhed in 1635, and may be confidered the firft link in the modern geometry. Mechanics and hydrodynamics were cultivated with equal fuccefs during this period. Torricelli, a pupil of Galileo, following the path of his mafter, made feveral important improvements; the moft celebrated of which was his determination of the gravitating power of the atmofphere. This difcovery led to that of the barometer, or rather perhaps the latter led to

 the

the former; for it was by an inftrument of this kind that he was enabled to determine the weight of this fluid. The refult obtained by this means was oppofed by various arguments, till the well-known experiment of the Puy-de-Dome fet the queftion at reft for ever. This experiment was projected by the celebrated Pafcal, to whom we are indebted for many important difcoveries in various branches of the mathematical fciences, particularly for the firft ideas of the doctrine of probabilities, which has become in latter times an extremely ufeful fcience, being that on which are founded all calculations connected with life-infurances and annuities. The fubject was but flightly touched upon by Pafcal, but was afterwards confiderably enlarged by Montmort, and finally completed by De Moivre.

At this period almoft every branch of fcience was cultivated with the happieft effect; problems were propofed by the mathematicians of one country as challenges to thofe of another; a lively emulation was excited between the contending parties; and each fupported the honour of his country with all the power he poffeffed. This was the means of producing many curious propofitions and interefting theories, but the limits of our article will not allow of entering upon this fubject, and we muft therefore reluctantly pafs over in filence many eminent writers of this time, whofe names would otherwife deferve to be recorded. We muft not, however, omit Dr. Wallis, who, in 1665, publifhed his Arithmetic of Infinites, a work abounding with genius, and of which the object was to determine the fums of various feries of numbers, the quadrature of certain curves, and many other fubjects, in which this author difcovered a profound knowledge of geometry and analyfis; to him we owe the method of denoting radical by fractional indices, as we do alfo the ufe of negative indices; Defcartes having employed exponents in pofitive and integral powers only. The theory of continued fractions alfo date their origin from this period, having been firft difcovered by lord Brounker, of Caftle Lyons, in Ireland, who was born in 1620, and died in 1684. Another eminent mathematician of this date deferves particular attention, the celebrated Huygens, a Dutchman, whofe extenfive and perfevering genius led him to the cultivation of every department of fcience; geometry, aftronomy, analyfis, and mechanics, are indebted to him for important improvements; in the former his theory of evolutes difplays the powers of his mind; in aftronomy his name will ever be remembered for his difcovery of what is now termed the fourth fatellite of Saturn, and the ring by which that planet is encompaffed; which difcoveries were made by means of a powerful telefcope which he had himfelf conftructed; the theory of pendulums, their vibrations, the centres of ofcillation, percuffion, and various other interefting and ufeful mechanical problems are due to this diftinguifhed author. (See HUYGENS.) It was alfo towards the conclufion of this century, at which we are now arrived, that the progreffive motion of light was difcovered by Roemer, a Danifh mathematician and aftronomer; before his time the propagation of light was fuppofed to be inftantaneous, but by obfervations of the eclipfes of Jupiter's fatellites, this was found to be erroneous, and not only its progreffive motion became obvious, but the velocity with which it moves was pretty accurately afcertained. Dr. Hooke, another celebrated Englifh philofopher of the fame date, here alfo claims our attention. To this diftinguifhed author we owe a variety of difcoveries and improvements in various branches of mechanics and aftronomy, but of all thefe, perhaps his ideas of univerfal gravitation, though they were not complete, are the moft deferving of notice. On this head he made the following fuppofitions: all the celeftial bodies have not only an attraction or gravitation towards their own centre, but they mutually attract each other in the fphere of their activity. All bodies which have a fimple and direct motion, would continue to move in a right line, if fome force were not inceffantly turning them out of it, and compelling them to defcribe a circle, ellipfis, or other curve. Attraction is fo much the more powerful, as the attracting body is more near. Thefe cafes all enter into the Newtonian fyftem, and only the law of attraction was wanting to render the theory complete.

We have not hitherto mentioned the name of Newton, though moft of his difcoveries were made prior to the beginning of the 18th century; becaufe we wifhed to confider this important epoch unconnected with any extraneous matter, and to bring together in this place only thofe diftinguifhed authors who contefted with each other that crown of glory, which by univerfal confent has been placed upon the brow of the Englifh philofopher. Under this clafs are included Leibnitz, and the brothers John and James Bernouilli, to whom muft alfo be added the marquis de l'Hôpital, a French nobleman, as much diftinguifhed for his amiable and upright difpofition as for his profound knowledge in analyfis and geometry. It does not enter into our plan to give a minute defcription of the labours of each of thefe authors, as that would far exceed the limits of this article; we muft therefore confine our obfervations to what may be confidered real difcoveries, and in thefe our illuftrious countryman will neceffarily form the moft prominent object; the Bernouillis undoubtedly poffeffed a moft powerful genius, and gave the folution of problems the moft refined that ever exercifed the mental faculties of man; ftill their works are not of that defcription which can properly form a part of a brief abftract of mathematical hiftory, though in a more extended account they would form a very confiderable part; the fame obfervation has place with regard to de l'Hôpital. To Leibnitz we are indebted for the difcovery of the differential calculus, at leaft it was he who firft publifhed it in the Leipfic Tranfactions for 1684, though his real claim to the original invention has been always a matter of difpute between the Englifh and foreign mathematicians; the former contending that he had derived his method from hints which he had received, and from letters that paffed between him and Newton and other Englifh analyfts. It is impoffible in this place to enter upon the merits of Leibnitz's claims to the priority of invention, we muft therefore refer the reader who wifhes to fee the matter fully inveftigated, to the "Commercium epiftolicum de Analyfi promota," publifhed by order of the Royal Society, in which the whole of this fubject is minutely inveftigated. Montucla has alfo given in his "Hiftoire des Mathematiques," an impartial inveftigation of thefe claims, but Boffut is evidently biaffed, and not only on this fubject, but in others relating to Newton is tardy in his acknowledgment of his fterling merit. With regard to Leibnitz and Newton, they were both rich in genius and invention, and it is not improbable that both arrived at the fame calculus by different routes. One is unwilling to attribute to fo celebrated a man as Leibnitz, fo mean an action as that of plagiarifm, and with regard to Newton it never was infinuated by any of his opponents that any charge of this kind attached to his doctrine of fluxions. In fact, when we confider the methods of *maxima et minima*, of Fermat, Roberval, and Hudde, and the differential triangle of Barrow, each of which were fo many advances towards the perfection of the new analyfis, it will not be at all furprifing that the fame general refults fhould be deduced by two fuch men as Leibnitz and Newton; where fo much had been already

ready prepared for their ufe, and which only wanted a great and comprehenfive genius to generalize and bring it to perfection. The invention of fluxions, though it will ever form a moft important era in the hiftory of the exact fciences, is ftill by no means the greateft of Newton's difcoveries. Phyfical aftronomy, chronology, and optics, are equally indebted to him, and fhew the power and extent of his univerfal genius. It would be ufelefs to attempt to enumerate in this place his difcoveries in thefe fciences, we muft therefore refer the reader to the articles ATTRACTION, GRAVITATION, FLUXIONS, OPTICS, &c. as alfo the biographical article NEWTON, where he will find a more ample detail of particulars than could with propriety be given in this general fketch, the object of which is not to enter into the minutiæ of the hiftory, but merely to trace the general outline of the progrefs of the fciences, and the connection and dependence of the feveral parts upon each other, which view of the fubject is loft in the detached hiftories of the feparate branches. We muft now pafs rapidly over the hiftory of the laft century, not that it is lefs prolific in events than the preceding, but becaufe the events are more recent, and many eminent authors of this period ftill exift, and are ftill enriching the fciences with their difcoveries. Of thofe that are no more, we ought particularly to diftinguifh Halley, Bradley, Taylor, d'Alembert, and Euler. Of thefe Halley will ever be remembered for his numerous and accurate aftronomical obfervations, and particularly for his being the firft and only aftronomer that ever truly predicted the return of a comet. The theory of the aberration of light will immortalize the name of Bradley; and the doctrine of increments will claim for its author, Dr. Taylor, a diftinguifhed place amongft modern geometers. D'Alembert is defervedly celebrated for his extenfive knowledge in elegant literature; while his theory of *partial differences*, and various other mathematical refearches, cannot fail of placing him in the firft rank of modern mathematicians. Euler's voluminous writings difplay in every part a fuperior and comprehenfive genius, and the clearnefs and perfpicuity with which he treated the various branches of analyfis and geometry, fhew the folidity and accuracy of his judgment: in fact, if we confider Euler as an analyft and geometrician, we cannot deny to him the honour which has been beftowed upon him by a celebrated author of the prefent day, *viz.* that he was one of the moft extraordinary men that any age or country ever produced. To thefe names we might add thofe of Cotes, Maclaurin, Simpfon, Cramer, Waring, and various others, but the limits of this article requires us to defift from any farther enumeration.

In the preceding pages, we have endeavoured to follow, as nearly as poffible, the order of time in which the feveral difcoveries and improvements were made, and, as far as we were able, to introduce all the moft prominent parts of the hiftory of mathematics, and the moft celebrated of its profeffors; but in the fhort fpace that this article occupies, it muft neceffarily have happened that many diftinguifhed names are omitted. To compenfate for this, in fome meafure, we have framed the following biographical chart, which exhibits, under one point of view, the dates, names, and difcoveries of all the moft eminent mathematicians from the earlieft period. Thofe who are more particularly celebrated are printed in Roman capitals, with the country in which they flourifhed, and that particular branch of mathematics in which they moft excelled, or which they have invented or improved. Where there is nothing of a particular nature whereby an author is diftinguifhed, his country only is given, and fome general term, as aftronomy, philofophy, mathematics, &c. to indicate to which branch of the fciences he more particularly directed his attention. But in the laft four centuries, in order to make more room, fuch remarks are omitted, and the name only retained. This table might have been much more extended had our limits admitted of it; but it is prefumed that few authors are omitted, who have contributed, in any confiderable degree, to the advancement of thofe fciences.

MATHEMATICS.

Chronological TABLE of the moſt eminent Mathematicians from the earlieſt Period to the preſent Time.

Cent.	Beginning.	Middle.	End.
B.C.	CONFUCIUS, 722 B.C.	Era of Nabonaſſar, 747 B.C.	CHIRON the Centeau, 960 B.C.
600	THALES, Gr. Predict. an Eclipſe. Anaximander, Gr. Celeſt. Globes.		
500	Cleoſtratus, Gr. Aſtronomy.	Anaxagoras, Gr. Philoſophy. Anaximenes, Gr. Sun Dial.	PYTHAGORAS, Gr. 47 Eu. Syſt. Aſt.
400	Euctemon, Gr. Aſtronomy. Meton, Gr. Metonic Cycle. PLATO, Gr. Geom. and Philoſ.	Hippocrates, Gr. Quad. of Lunes.	Œnopides, Gr. Geometry. Zonodorus, Gr. Geometry.
300	ARISTOTLE, Gr. Philoſophy. Calippus, Gr. Aſtronomy. Dinocrates, Gr. Architecture. Theophraſtus, Gr. Hiſt. and Math. Xenocrates, Gr. Architecture.	EUDOXUS, Gr. Geom. and Aſtron.	PYTHEAS, Gaul, Navig. & Aſtron. Archytas, Gr. Math. and Phil. Ariſtæus, Gr. Conic Sections. Dinoſtratus, Gr. Quadratix. Menechmus, Gr. Geometry.
200	APOLLONIUS, Gr. Geometry and Conic Sections.	*ARCHIMEDES.* Ariſtarchus, Gr. Aſtronomy. Eratoſthenes, Gr. Meaſ. a Degree.	EUCLID, Gr. Elem. Geo. & Optics. Aratus, Gr. Poet. and Aſtron. Ariſtillus, Gr. Phil. and Aſtron. Nichomedes, Gr. Conchoid.
100		HIPPARCHUS, Gr. Length of Year, N° the Stars. Cteſibius, Gr. Water Pumps. Hero, Gr. Hero's Foun. Clepſydra.	
0 Chriſt. Era.	Manilius, Rom. Poet. and Aſtron. Manlius, Rom. Aſtronomy.	CÆSAR, JULIUS, Ref. the Calendar. Soſigenes, Egypt. Aſtronomy.	Poſidonius, Rom. Mech. and Math. Theodoſius, Rom. Spherics.
A.D. 0	Cleomedes, Rom. Aſtronomy. Geminus, Rhodes, Geom. & Aſtron. Vitruvius, Rom Architecture.	Menelaus, Rom. Spher. Trigonom.	Jamblicus, Syria, Philoſophy.
100	Frontinus, (Sixtus), Rom. Engin. Nicomachus, Gr. Mathematics.	Hypſicles, Gr. Mathematician. PTOLEMY, Claud. Egypt. Almag.	
200		Diophantus, Gr. Diophan. Analyſis.	
300		Jamblicus, alſo of Syria, Philoſophy.	Pappus, Gr. Geometrical Loci. Theon, Gr. Philoſophy.
400	Hypatia, Daugh. of Theon, Com. on Diophan.	Proclus, Gr. Comment. on Euclid.	Diocles, Gr. Ciſſoid. Serenus, Gr. Geometry.
500	Marinus, Naples, Geometry.	Anthemius, Rom. Archit. Domes. Eutocius, Gr. Geometry. Iſodorus, Rom. Architecture.	
600	Alexandrian Library deſtroyed 642, A.D.		Beda, the Venerable, Engl. Monk.
700		Almanſor, the Victorious, Aſtron.	Hero, the Younger, Gr. Geometry,
800	Almaimon, Arab. Prince, Aſtron. Alraſhed, Perſia, Aſtronomy.	Alfragan, Arab. Aſtronomy.	Albategni, Arab. Aſtronomy. Thebit Ibn Chora, Arab. Aſtron.
900		(Gebert), Silveſter II. Spain, Math.	

Cent. A.D.	Beginning.	Middle.	End.
1000	Ibn Ionis, Arab. Aſtronomy.	Geber Ben Alpha, Ar. Com. Almag.	
1100	Alhazen, Arab. Optics & Aſtron.		
1200	LEONARD, (de Piſa), Firſt European Algebraiſt. Naſſir Eddin, Perſian, Aſtronomy.	Alphonſo, k. of Caſtile, Alph. Tab. Halifax, or Sacroboſco, Eng. Math. Jordanus Nemorarius, Math.	BACON, Eng. Philoſopher. Campanus, Theory of Planets. Vitellia and Pecam, Optics.
1300	Albano, Ital. Phyſician and Math. Aſcoli, Ital. Mathematician.	John of Saxony, Aſtronomy.	
1400	Bianchini, Ital Aſtronomy. Moſchopulus, Mod. Gr. Mag. Squ. Purbach, Vienna, Aſtronomy.	REGIOMONTANUS, Vien. Aſtron. Cuſa, Cardinal, Aſtronomy. Henry, Duke of Viſco, Sea Charts. Ulug. Bieg, Tartar Prince, Aſtron.	Bernard of Granolachi, Aſtron. Lucas de Burgo, Geom. Algebra. Novera, Dominic, Ital. Aſtron.
1500	COPERNICUS, Ger. Syſt. of Aſtron. Apian. Buteo. Cardan. Commandine. Durer, Albert. Ferriers. Maurolycus. Nonius. Sturmius. Tartaglia. Werner.	VIETA, France, Angular Sections. Ferrari. Memmius. Mercator. Ramus. Recorde. Reinhold. Rothman. Stiffelius. Ubalch Guido. Vennatorius. Zemberti.	BRAHE, Tycho, Daniſh, Aſtron. BACON, Lord F. Eng. Philoſopher. GALILEO, Ita. Law of falling Bodies. Bombelli. Byrgius. Clavius. Caſtelli. Digges. Ghetaldus. Mæſtlin. Rheticus.
1600	BRIGGS, Eng. Preſent Syſt. of Log. DES CARTES, Fr. Equation of Curve Lines. KEPLER, Ger. Laws of Cel. Motions. NAPIER, Scot. Logarithms. TORRICELLI, Ital. Gravity of the Atmoſphere. Bayer. Beaugrand. Beaume, De. Ceulen. De Dominis. Gaſſendi. Gellibrand. Guldin. Halifax, or Longomontanus. Harriot. Horrox. Kircher. Lucas Valerius. Metius. Otho. Oughtred. Pitiſcus. Planudes. Romanus. Urſinus. Porta Baptiſta.	CAVALERIUS, Milan, Indiviſibles. BROUNKER, Irel. continued Fract. FERMAT, France, Max. et Min. Theory of Numbers. PASCAL, Fr. Doct. of Probabilities. WALLIS, Eng. Arith. of Infinites. Bartholin. Borelli. Bullialdus. Dechales. Frenicle. Girard, Albert. Gregory, J. & D. Henrion. Hevelius. Horrebow. Merſennus. Riccioli. Roberval. Sluſius. Snellius. Tacquet. Tchirnhauſen. Vincent, St. Gre. Viviani. Vlacq. Ward, Seth. Witt, John de.	BERNOUILLI, James, Swiſs, Math. BARROW, Eng. Mathematics. HOOKE, Eng. Phil. and Mech. HUYGENS, Hol. Evolute of Curves. LEIBNITZ, Germ. Diff. Calculus. L'HOPITAL, Fran. Mathematics. ROEMER, Dan. Prog. Mot. of Light. Amontons. Auzout. Bachet. Fagnani. Flamſteed. Grimaldi. Guido Grandi. Hudde. Kerſey. Kinghuyſen. Lagney. Lieutard. Maraldi. Molyneux. Oldenburgh. Ozanam. Pell. Picard. Reyneau. Schooten. Wren.
1700	*NEWTON.* BERNOUILLI, John, Swiſs, Math. BRADLEY, Eng. Aberration of the Stars. COTES, Eng. Mathematician. TAYLOR, Eng. Increments. Billy, De. Brackenridge. Caſſini, (D. & J.) Craig. Graveſande. l'Hire. Keill. Laloubere. Lomſberg. Manfredi. Marchetti. Meibomius. d'Omerique, H. Pemberton. Preſtet. Saunderſon. Saurin. Sterling. Ulloa. Varignon. Verbieſt. Wolfius.	CLAIRAUT, Fran. Mathematics. MACLAURIN, Scot. Mathematics. DE MOIVRE, Eng. Mathematics. SIMPSON, Eng. Mathematics. Bellidor. Bernouilli, N. Bernouilli. D. Bougainville. Boguer. l'Caille. Collins. Courtivron. Cramer. Dodſon. Dollond. Fatio. Fountain. Goldbach. Guiſnée. Herman. Jacquier. Koenig. Long. Mairan. Marriotte. Maupertuis. Mayer. Montmort. Nicole. Riccati. Robins. le Seur. Simſon. Walmſley.	D'ALEMBERT, Fran. Partial Diff. EULER, Germ. Mathematics. LANDEN, Eng. Reſidual Analyſis. WARING, Eng. Mathematics. Agneſia, Donna. Atwood. Bailly. Bezout. Borda. Carnot. Emerſon. Horſley. Keſtner. Lalande. Maſkelyne. Montucla. Pingre. Robiſon. Steward. Vandermond. Vega. Wargentin.

MATHEO, St., in *Geography*, a town of Spain, in the province of Valencia; 27 miles S.S.W. of Tortoſa.

MATHEPOUR, a town of Hindooſtan, in Guzerat; 30 miles N.W. of Puttan-Sumnaut.

MATHER, Increase, in *Biography*, an eminent American divine, who flouriſhed in the 17th and 18th centuries, was born at Dorcheſter, in New England, in the year 1635. He purſued his academical courſe of ſtudies at Harvard college, in Cambridge, where he took his degree of B. A. in 1656. In the following year he made a voyage to England, and from thence he went to Ireland, and having a brother, miniſter to a congregation at Dublin, he entered himſelf of Trinity college, in which he proceeded M. A in 1658, having performed the neceſſary exerciſes with great applauſe. He was not more diſtinguiſhed for his talents than reſpected for the ſuavity of his manners and the rectitude of his deportment, and was offered a fellowſhip in that inſtitution; but finding the climate of the iſland unfavourable to his health, he returned to England, and officiated for ſome time as miniſter, in the place of Mr. Howe, at Great Torrington, in Devonſhire. Upon the return of the paſtor to his flock, in 1659, Mr. Mather accepted an invitation to become chaplain to colonel Bingham, governor of the iſland of Guernſey, and preached every Sunday, as well before the garriſon, as in the town of Peter le Port. When the time came that he was obliged to conform to the eſtabliſhed religion, or quit his ſituation, he readily ſubmitted to the latter, and returned to England. Here he might have had valuable church preferment, but he choſe a clear conſcience to any thing that the world could offer, and failed for New England, where he was choſen miniſter to the New Church at Boſton. Shortly after this, he married the daughter of Mr. John Cotton, a gentleman of conſiderable eminence in England, from whence he had been driven on account of his non-conformity. He had formerly been vicar of Boſton in Lincolnſhire, in England, and was now ſettled as miniſter at Boſton in America. In 1664, Mr. Mather was ordained to the paſtoral office, the duties of which he performed through life with credit to himſelf, and highly eſteemed by his people. In the year 1683, when king Charles II. required the inhabitants of New England to ſurrender their charter, Mr. Mather attended at a meeting of the freemen of Boſton, and by his zealous perſuaſions determined them to reject a motion for that purpoſe unanimouſly, and to leave the iſſue to Providence, rather than become the degraded inſtruments of voluntarily ſacrificing their liberties. This ſpirited meaſure had conſiderable influence in prevailing on the country in general to imitate the example ſet by the Boſtonians. Upon the publication of king James' ſecond declaration for liberty of conſcience, ſome of the miniſters of New England, and their churches, drew up addreſſes of thanks to him for the benefits which they enjoyed in conſequence of it, and Mr. Mather proceeded to England for the purpoſe of preſenting them. He was favourably received at court, and laid before the king the ſtate of the country. While he continued in England, the revolution took place, and he was conſulted by the new adminiſtration on many political topics, particularly on an attempt to obtain the reſettlement of the Maſſachuſetts colony, upon their chartered foundation, by an act of parliament, which was fruſtrated by its diſſolution. He at length obtained from his majeſty a new charter, containing the whole of the old one, with the addition of new and more ample privileges. Having rendered this important ſervice to his fellow citizens, he ſet ſail for America in 1692, and on his return he received the public thanks of the houſe of repreſentatives for his faithful and zealous endeavours to benefit his country. He now returned to his labours in the church, and at Harvard college, of which he was choſen preſident in 1684, and alſo created doctor of divinity. He died in 1723, at the age of 84. He was author of many theological tracts: of "A brief Hiſtory of the War with the Indians in New England;" of "An Eſſay for the recording of illuſtrious Providences, wherein an account is given of many remarkable and memorable events which have happened in this laſt age, eſpecially in New England;" of "A Diſcourſe on Comets;" "A Diſcourſe concerning Earthquakes, &c."

Mather, Cotton, ſon of the preceding, was born at Boſton in 1662-3, and was, while very young, diſtinguiſhed by his great proficiency in the learned languages. At twelve years of age he was thought to be well qualified, by his previous knowledge, for entering on academical ſtudies, and was accordingly admitted to Harvard college, where, in a very ſhort time, he ſurpaſſed his contemporaries in the different branches of literature and ſcience. Before he was twenty years of age he had taken his degrees of B. A. and M. A. He now undertook the office of tutor, which he retained with great reputation for the ſpace of about ſeven years, and he had, afterwards, the ſatisfaction of ſeeing ſeveral of his pupils become eminent characters in the church and the world. In early life he was afflicted with a ſtammering, or impediment in his ſpeech; but by great attention and care he overcame the defect, and engaged in the ſervices of the pulpit in the year 1680. He was firſt elected as aſſiſtant to his father in the church at Boſton; and in 1684 he was ordained as co-paſtor. He was indefatigable in every duty in which he engaged; and to render himſelf more extenſively uſeful, he applied to the ſtudy of the modern languages, and made himſelf maſter of the Iroquois Indian tongue, ſo that he was able to write and publiſh treatiſes in each of theſe languages. He was frequently conſulted on matters of ſtate by the magiſtrates, and more than once ſucceeded in quelling dangerous riots by the force of his perſuaſion. In one thing, however, he was ſtrangely miſguided by the prejudices of the times in which he lived; he believed in the powers of witchcraft, and joined in the perſecutions that were carried on in that country, againſt ſome poor creatures who had incurred the diſpleaſure of their neighbours on this head. He contributed to promote the phrenzy of the time by publiſhing the trials of the accuſed, and by ſome other writings in ſupport of the abſurd and pernicious doctrine of witchcraft. In every other reſpect he was uniformly influenced by a moſt diſintereſted regard for the public good: he planned and promoted ſeveral uſeful inſtitutions, and he was an active member of a ſociety whoſe profeſſed buſineſs was to compoſe differences and prevent law-ſuits. He was a commiſſioner for Indian affairs, and exerted all his powers to promote the inſtruction and happineſs of the native inhabitants. He was the firſt perſon that introduced the practice of inoculation for the ſmall-pox into America. His fame was not confined to his own country; but his merit was known and acknowledged in diſtant parts. In 1710, the univerſity of Glaſgow conferred on him the degree of doctor in divinity, and in 1714 the Royal Society of London elected him one of their body. He died in 1727-8, when he had completed his ſixty-fifth year, leaving behind him a character for great piety and benevolence; he was as a man and a member of ſociety, polite, friendly, and a moſt entertaining as well as inſtructive companion. He publiſhed nearly four hundred diſtinct pieces, many of which were, of courſe, very ſmall, ſuch as ſingle ſermons, eſſays, &c. Among theſe, we may notice "Magnalia Chriſti Americana; or, An Eccleſiaſtical Hiſtory of New

New England from its firft planting in 1620 to 1698;" "The Wonders of the Invifible World; being an account of the trials of feveral witches lately executed in New England, and of feveral remarkable curiofities therein occurring;" "Johannes in Eremo: or, The Lives of feveral famous Divines;" and "India Chriftiana; or, An Account of the Propagation of Chriftianity in the Eaft and Weft Indies." Our author, during a great part of his life, was honoured by an epiftolary correfpondence with feveral perfons of eminent character for piety and learning, and among others with that of lord chancellor King, lord Barrington, Mr. Whifton, M. Defaguliers, and the celebrated doctor Franke, profeffor of divinity in the univerfity of Halle in Saxony. Biog. Brit.

MATHIEU, St., in *Geography*, a town of France, in the department of the Upper Vienne, and chief place of a canton, in the diftrict of Rochechouart; 12 miles S.S.W. of St. Junien. The place contains 1946, and the canton 9699 inhabitants, on a territory of 252½ kiliometres, in 10 communes.

MATHRAVEL, a village of North Wales, in the county of Montgomery; once the feat of the prince of Powis, and fuppofed to be the ancient city called "Mediolanum," now reduced to a farm-houfe; five miles N.W. of Welfhpool.

MATHURINS, in *Ecclefiaftical Hiftory*, a name given to the brethren of the Holy Trinity, from their having a monaftery at Paris, erected in the place where there is a chapel confecrated to St. Mathurin. See Trinitarians.

MATHUSEN, or Mauthausen, in *Geography*, a town of Auftria, fituated on the Danube; feven miles E. of Steyregg.

MATIANA, in *Ancient Geography*, a country of Afia, between Armenia and Media; called by Strabo the Martianane of Media.

MATIAS, St., in *Geography*, a town of New Navarre; 150 miles W. of Cafa Grande.

MATICA, St., a town of Ruffia, in the government of Revel, on the gulf of Finland; 20 miles N.E. of Revel.

MATICALAS, a river on the W. coaft of New Mexico; feven leagues from Cateltaftrand, or the port of Sanfonate, known by fome high but fmall hills that are oppofite to it, and much expofed to northerly winds.

MATIGNAN, a town of France, in the department of the North Coafts, and chief place of a canton, in the diftrict of Dinan; 14 miles N.W. of Dinan. The place contains 996, and the canton 8894 inhabitants, on a territory of 200 kiliometres, in 11 communes.

MATILDA, or Maud, in *Biography*, emprefs of Germany, and queen of England, daughter of Henry I. king of England, and Matilda of Scotland, was born in 1102. At eight years of age fhe was betrothed to Henry V., emperor of Germany, and was fent over to that country for education. The emperor dying, without iffue, in the year 1125, Matilda returned to the court of her father, who, having loft his only fon, caufed all the nobles, prelates, &c. to fwear fealty to her as his fucceffor, in cafe he fhould die without male iffue; and in 1127 he married her to Geoffrey, eldeft fon of Fulk, count of Anjou. She now went to refide in Normandy, and in 1132 fhe was delivered of a fon, afterwards Henry II.; and by the death of her father, in 1135, fhe became heirefs of all his dominions in England and France. She was then refiding at Anjou with her hufband, of which circumftance Stephen, earl of Blois, took advantage, and feized upon the crown of England. The barons of Normandy followed the example of the Englifh in fubmitting to Stephen, fo that Matilda was almoft inftantly deprived of the inheritance which her father had attempted to fecure for her. The government of Stephen was foon hated, and Matilda, in 1139, landed in England, and a number of the moft powerful barons, without hefitation, declared in her favour. A civil war enfued, and, in 1141, Stephen was taken prifoner, and Matilda was crowned queen of England in the cathedral of Winchefter. She was naturally of a haughty difpofition, and, overfet with her good fortune, fhe refufed to liften to the requefts of her nobles, and infolently rejected the petition of the Londoners for the reftoration of the laws of Edward the Confeffor. Confpiracies were formed to feize her perfon, but fhe efcaped the machinations of her fubjects, and withdrew to Normandy in the year 1148, where fhe fpent the remainder of her days. She died in 1167. Hume.

Matilda, countefs of Tufcany, the daughter of Boniface, marquis of Tufcany, celebrated for her attachment to the papal fee, was born, according to fome accounts, in 1039, and, according to others, in 1046. She firft married Godfrey le Boffu, fon of the duke of Lorraine, but lived almoft entirely apart from him, not chufing to follow him from Italy to a ruder climate. Godfrey died in 1076, and in the fame year, by the death of her mother Beatrice, fhe fucceeded to vaft poffeffions in Italy. She now put herfelf entirely under the direction of Gregory VII. efpoufed his caufe with all the zeal of a partizan, and in the year 1077 fhe made a reverfionary grant of all fhe poffeffed to the church, to the prejudice of the emperor, Henry IV., to whom they would have devolved on her death. She affifted the pope with all the forces fhe could raife, and feveral times appeared in perfon at their head. After the death of Gregory, in 1085, Matilda ftill continued to give her fupport to the Roman fee under his fucceffors, Victor III. and Urban II. In 1089, fhe married, a fecond time, Guelph, fon of the duke of Bavaria, a diftinguifhed leader in the party adverfe to the emperor. Matilda died in 1115, having folemnly confirmed her dominions to the holy fee. The popes, however, were not able quietly to take poffeffion of thofe vaft eftates; and the conteft for them was the fource of long continued wars between them and the emperors. A part only of the donation finally took effect; neverthelefs, Matilda is juftly regarded by the votaries of the holy fee as the greateft temporal benefactor it ever poffeffed. This circumftance has rendered her a fubject for extravagant panegyric with one party, and for very fcandalous imputations with the oppofite. Univer Hift.

Matilda, in *Geography*, a townfhip of Upper Canada, in the county of Dundas, being the fixth townfhip in afcending the river St. Laurence; a few miles N.W. of Ofwegetchie.

MATILLA, a town of Spain, in the province of Leon; 20 miles S.S.W. of Salamanca.

MATIN, a river of Canada, which runs into the St. Laurence; 150 miles below Quebec.

Matins. See Mattins.

MATINA, in *Geography*, a town of Mexico, in the province of Cofta Rica; 60 miles N.N.E. of Carthage.

MATINATA, *Ital.*, a lover's morning fong, under the window of his miftrefs. The Crufca dictionary defines it, "Compofizione da cantare e fonare, che fanno gli amanti in ful matino davanti alla cafa della inamorata; come ferenata quel che fanno la notte al fereno:" a compofition fung and played by a lover in a morning, under the window of his miftrefs; as a *ferenata* is performed in a fimilar manner in the evening. See Serenata.

MATINICUS Islands, in *Geography*, iflands of America, on the coaft of Maine. Matinicus lies in N. lat. 43° 56′. W. long. 68° 20′.

MATINO,

MATINO, a town of Naples, in the province of Otranto; 10 miles E. of Gallipoli.

MATISFALVA, a town of Tranfylvania; feven miles E.S.E. of Samofvivar.

MATITES, in *Natural Hiftory*, the name of a ftone defcribed by feveral authors. The characters they give of it are, that it is of a pale greyifh colour, and of the form of the nipples of a woman's breafts, feveral of thefe nipples appearing upon one ftone.

It is plain, that there needs no more to the formation of one of thefe matitæ than the petrifaction of a piece of the fhell of one of the *echini marini*, or fea-eggs, which have large papillæ, fuch as thofe of the Red fea, with fome of its papillæ upon it. As to the colour, it is not to be limited to grey alone, but may be various as the colours of ftones, fince any fpecies of ftone may have gone to the formation of it; and whatever colour the ftony matter was, of that will the matites be.

MATKNELTZEL, in *Ornithology*, the name of a bird approaching to the fnipe kind, and called by Gefner *gallinula erythra;* and by the common people of Germany, *mattkern.* It is common in watery places in many parts of Germany and Italy. See FULICA *maculata.*

MATLOCK, in *Geography*, a village and parifh in the wapentake of Wirkfworth, Derbyfhire, England, is fituated on the eaftern banks of the river Derwent, 17 miles diftant from Derby, and 143 from London. At the time of compiling the Domefday book, it was a hamlet of the manor of Metesford, which was part of the demefnes of the crown. It was afterwards held by William de Ferrers, earl of Derby, but on the attainder of his fon Robert reverted to the crown; and being granted by Edward I. to Edmund earl of Lancafter, continued a part of that earldom and duchy till the reign of Charles I., when it was fold to the copyholders of the manor, and is now divided into fmall fhares. According to the return made under the population act of 1800, this parifh contained 492 houfes, occupied by 2354 perfons. The inhabitants are chiefly employed in the neighbouring lead mines, and in the manufacture of cotton. The houfes are principally of ftone; and at the entrance of the village is a neat ftone bridge. The church, which ftands on the verge of a romantic rock, confifts of a nave, fide aifles, and a fmall chancel. On the eminence called Riber, are the remains of a druidical altar, or cromlech, called the *Hirft ftones.* It is compofed of four maffes of grit-ftone, one of which, apparently the fmalleft, is placed on the others, and is computed to weigh about two tons. On this upper ftone is a circular hole, fix inches deep, and nine in diameter, wherein, till about the middle of the laft century, ftood a ftone pillar.

About a mile and a half from the village is Matlock-bath; which, though few fituations can be more beautiful, was only occupied by fome rude cottages inhabited by miners, till its warm fprings began to attract notice, for their medicinal qualities, about the year 1698. At that period the original bath was built, and a houfe alfo built for the accommodation of vifitors. A fecond fpring having been difcovered, a new bath and lodging-houfe were erected. At a later period, a third fpring was found; another bath and houfe were confequently built; the latter, by various alterations, is become one of the moft commodious hotels in England. Thefe buildings are of ftone, and are refpectively named, the Old Bath, the New Bath, and the Hotel. In thefe, and two private lodging-houfes, five hundred perfons may at the fame time be accommodated. The Matlock feafon commences at the end of April, and continues till November.

The fcenery of Matlock dale is peculiarly romantic and picturefque; being diverfified with rugged rocks contrafted with the fineft verdure. Two of thefe rocks, the High Tor, and Maffon hill, are worthy of notice. The former is upwards of 350 feet in height; the lower part is covered with fmall trees and underwood of various foliage; but the upper part, for fifty or fixty yards, is one broad mafs of naked perpendicular rock. The fragments that have fallen from it form the bed of the river which flows immediately below. After heavy rains, the impetuofity of the current is greatly increafed, and the fublimity of the view proportionably augmented. Oppofite to the High Tor, but rifing with a gentler afcent, though to a greater elevation, is Maffon hill, which appears like a pile of immenfe craggs. The fummit of this mountain has been named the Heights of Abraham, and overlooks the country to a vaft extent, befides commanding a beautiful bird's-eye view of nearly the whole dale. The height of this ftupendous eminence is about 250 yards; the path to its fummit has been carried in a winding or rather zigzag direction. and in various places has been planted with rows of firs, which opening at convenient diftances, admit the eye to range over the fcenery beneath, from different points of view. Near the upper end of the dale is a fpacious building, erected for the manufacture of cotton, by the late fir Richard Arkwright, and now the property of his fon Richard Arkwright, efq., whofe elegant manfion, Willerfley caftle, ftands on the fouth fide of a commanding eminence, which terminates the extenfive range of rocks that forms the eaftern boundary of the Derwent, in its courfe through Matlock dale. The caftle confifts of a body, in the form of an oblong fquare, having a circular tower rifing from the centre of the roof, and a femicircular tower projecting from the front on each fide of the entrance, and two wings with a round tower at each angle; the whole ftructure is embattled, and the walls are of free-ftone. Beauties of England and Wales, vol. iii.

MATLOCK *Waters.* See *Matlock* WATERS.

MATMAI, one of the Kurile or Kurilfkoi iflands, the fouthernmoft and largeft, fubject to the Japanefe, and fortified and garrifoned on the fide toward the continent. The channel between this ifland and Japan is faid to be no more than 60 verfts wide, and full of rocks. The current is very rapid. On the fouthern promontory ftands the Japanefe town Matmai, where the fupreme commander refides. The hairy Kurils are in poffeffion of the inland parts of the ifland. The Japanefe and Chinefe refort hither in trading veffels for the purpofes of commerce, which confifts in bartering with the Kurils for fea-otters, feals, and various forts of furs; alfo fat, oil, and blubber of whales, and other marine animals; eagles' feathers for fledging their darts and arrows, and other articles, in exchange for filk and cotton pieces for garments, japanned veffels, rice, brandy, tobacco, fabres, knives, pots, and kettles, hatchets, and the like. In the region of the bay Atkis, the land extends northward in a great headland, where lofty mountains rife on all parts, tending eaftward in ridges: within land are fpacious vales between the mountains, and large rivers roll in currents to the fea. The coaft abounds in bays and bights, which might be made to ferve for harbours. The forefts confift of oaks, beech, elm, birch, willow, and other trees of unknown fpecies. The fields produce a multitude of unknown vegetables, among which are ftrawberries, cranberries, bilberries, and a large fort of hips and haws. Of animals, the forefts afford haunts to black bears, elks, roebucks, deer, fables, foxes, hares, and river-otters. The bays and inland lakes fwarm with all kinds of ducks and water-fowl; nor is the country deficient in frogs and fnakes.

MATO, in *Natural History*, the name of a tree growing both in the East and West Indies, and bearing a fruit of the size of an apple, and covered with a thick and tough red skin. This is called by some the wild mangoustan. Its fruit perfectly resembles that of the mangoustan in figure, but is not eatable. Mem. Acad. Par. 1699.

Mato *Dentoo*, in *Geography*, a town of Brasil, in the government of Minas Geraes; 45 miles N N.E. Villarica.

MATOBOLO, one of the smaller Philippine islands, near the N. coast of Panay. N. lat. 11° 56'. E. long. 122° 45'.

MATOCHNIK Scher, a strait which divides Nova Zembla, always filled with ice. N. lat 75°.

MATOGROSO, or Matto-grosso the most inland, and the most celebrated province of Brasil. According to Alcedo, the Portuguese first took possession of it in 1761, having discovered the richness of its gold mines, by means of the Missionaries, to whose pious and benevolent labours we are chiefly indebted for the discovery of the interior parts of Cabralia, or as it is called by the Portuguese, Land of the Amazons, though widely remote from the river idly so called. A town was erected, and a governor appointed. As in mining stations in general, the land is barren, and provisions scarce and dear. The climate is hot and moist. It was in vain attacked in 1766, by orders of the viceroy of Peru, the Spaniards being obliged to retreat by the difficulty of the route, and the valour of the Portuguese. S. lat. 10 to 23. W. long. 52 to 64.

MATOMKIN, Great and Little, two small islands in the Atlantic, near the coast of Virginia; the former in N. lat. 37° 42'. W. long. 75° 36', and the latter in N. lat. 37° 38'. W. long. 75° 42'.

MATONBACKRAPETTA, a town of Hindoostan, in the circar of Cuddapa; 32 miles S.S.E. of Cuddapa.

MATOON Harbour, a harbour on the southern coast of Nova Scotia. N. lat. 44°. W. long. 64° 45'.

MATOUR, a town of France, in the department of the Saône and Loire, and chief place of a canton, in the district of Macon; 13 miles W. of Macon. The place contains 2062, and the canton 6378 inhabitants, on a territory of 152½ kiliometres, in nine communes.

MATOUREA, in *Botany*, a plant so called by Aublet, and figured in his Guian. t. 259, appears to be properly referred by Schreber to Vandellia. It is known to the Creoles by the name of *Basilic sauvage*, or Wild Basil, having the foliage of an *Ocymum*, with a bitterish, somewhat aromatic, flavour, and is used, either bruised or in decoction, as a vulnerary, being considered very efficacious in that respect. It is a native of meadows in Cayenne and Guiana, flowering all the year round. The *root* is annual. *Stem* two feet high, much branched, square, leafy, slightly downy. *Leaves* opposite, an inch long, ovate, serrated, downy, paler beneath; elongated and entire at the base. *Flowers* axillary, blueish, generally solitary. We are not informed of the derivation of the above name, nor whether the French *Matouri* be the original or the translation.—This plant is the *Vandellia pratensis* of Vahl, as well as of Willd. Sp. Pl. v. 3. 343, and is said to be extremely common in South America, by road sides, from the island of Trinidad to the Brasils. See Vandellia.

MATRA, in *Geography*, a chain of mountains in Hungary, S W. of Erlau.

MATRAMODO, a town of Hindoostan, in the Carnatic; 27 miles W. of Vellore.

MATRASS, Matracium, or *Bolt-head*, a glass vessel, used by chemists in digestions, and other operations.

The matrass is made in form of a bottle somewhat bellied in the middle, with a long narrow neck; it is coated with earth, when it is to be placed on a very hot fire. And when it is required it should be stopped very close, they seal it hermetically.

The matrass, used in assaying, is a vessel of very pure and transparent glass, not too thick at the bottom, which would make it apt to burst in the fire. It is, for this use, to be about eight or ten inches high, and to have an orifice scarcely so much as half an inch wide, lest the matters contained in it, being in a violent state of ebullition, should either rise over the mouth of the vessel, or at least be partly thrown out in form of small drops, like a thin rain, which drops always carry some of the metal with them. The bottom is capacious enough when it will hold an ounce or two of aquafortis, and the height of the vessel is of a farther use in making a greater repercussion of the fumes. The mouth ought also to be turned backwards, in form of a broad lip, that the solutions, when poured out, may not run down the sides of the vessel. Cramer, Art of Ass. p. 68.

Matrasses are also used as receivers: as to their form, some are spherical, others flattened at the bottom, and others in the shape of an egg, called *philosophical eggs*. The most convenient of all, when only a small quantity of matter is used, are bottles of thin glass, called medical phials; because they are cheap, made of good glass, and may be quickly heated, so that the liquor contained in them shall boil without danger of being broken. See Laboratory.

MATRAY, in *Geography*, a town of the Tyrolese; 10 miles S. of Inspruck.

MATRI, among *Hindoo Mythologists*, is a term applied to several of their female divinities, or divine mothers, the meaning of the word. It seems nearly the same as Sakti, which, however, is generally stated to mean the active energy of a power, rather than a mother. (See Sakti.) In the eighth volume of the Asiatic Researches, Mr. Paterson enumerates eight of these Saktis, as follows:

1. Maheswari, the Sakti of Mahesa or Siva. 2. Saraswati; in this character, indeed, more correctly called Brahmi or Brahmani, Sakti of Brahma. 3. Narayani of Narayana. 4. Indrani, or Aindri, of Indra. 5. Kaumari of Kartikya. 6. Varahi of Vishnu, in the Varahavatara. 7. Narasinhi of Vishnu, in the Narasingavatara. (Of all these due mention is made under their several names.) 8. Aparajita, a form of Bhavani, the female principle. The last, Mr. Paterson remarks, may be the Aphrodite of the Greeks; and Maheswari, or a female Siva, riding on a white bull, may have given rise to the story of Europa's rape, while Brahmi, or the female Brahma, with the swan, may, in like manner, have occasioned the fable of Jupiter and Leda. These explanations were, perhaps, invented by the Greeks, to account for symbols, of the meaning of which they were ignorant. On the foregoing passage, Mr. Colebrooke, the worthy successor of sir William Jones in the chair of the Asiatic Society, gives, in a note, the following information. "The eight Saktis, or energies of as many deities, are also called Matris, or mothers. They are called Brahmi, &c. because they sprung from the bodies of Brahma, and the other gods respectively. In some places they are thus enumerated: Brahmi, Maheswari, Aindri, Varahi, Vaishnavi, Kaumari, Chamunda, and Charchika. Some reduce the number to seven; omitting the two latter, and adding Kauveri (which see.) Prayers are addressed to the Matris on various occasions, especially in the Cavachas, or defensive incantations. (See Mantra.) Two are cited by way of example, and an extract from the Marcandeya Purana, descriptive of these goddesses. "May Brahmani, conferring the benefit of all benedictions, protect me on the east;

eaft; and Narayani on the fouth-eaft, for the fake of realizing every wifh; Mahefwari too on the fouth, rendering every thing aufpicious; Chamunda on the fouth-weft, difcomfiting all enemies; and on the weft Kaumari, armed with her lance and flayer of foes; on the north-weft, Aparajita, the beauteous giver of victory; on the north Varahi, granter of boons; and on the north-eaft Narafinhi, the banifher of terror. May thefe mothers, being eight deities and active powers, defend me." Another incantation fimply enumerates the fame eight goddeffes, and proceeds thus: "May thefe, and all Matris, guard me with their refpective weapons on all quarters, and on every point." In the Devi Mahatmya, the affembling of the Matris to combat the demons is defcribed, and we fhall extract the paffage, with fome others, as defcriptive generally of the principal female divinities of the Hindoos, and throwing fome light on an obfcure, but interefting, branch of the mythology of that, and we may fafely fay of other, people. "The energy of each god, exactly like him, with the fame form, the fame decoration, and the fame vehicle, came to fight againft the demons. The Sakti of Brahma, girt with a white gourd, arrived on a car yoked with fwans; her title is Brahmani. Mahefwari came riding on a bull, and bearing a trident, with a vaft ferpent for a ring, a crefcent for a gem. Kaumari, bearing a lance in her hand and riding on a peacock. Vaifhnavi alfo arrived, fitting on an eagle, and bearing a conch, a difcus, a club, and a bow and a fword in her feveral hands. The energy of Hari, who affumed the unrivalled form of the holy boar, likewife came there, affuming the body of Varahi. Narafinhi too, embodied in a form precifely fimilar to that of Nrifinhi, with an erect mane reaching to the hoft of ftars. Aindri, came, bearing the thunder-bolt, and riding on the king of elephants, and in every refpect like Indra, with a hundred eyes. Laftly, came the dreadful energy named Chandika, who fprung from the body of Devi, horrible, howling like a hundred fhakals; fhe, furnamed Aparajita, the unconquered goddefs, thus addreffed Ifani, whofe head is encircled with his dufky-braided locks."—"Thus," continues the ftory, which is too long for infertion, "did the wrathful hoft of Matris flay the demons."

In the Uttara kalpa of the fame Purana, the Matris are thus defcribed: "Chamunda ftanding on a corpfe; Varahi fitting on a buffalo; Aindri mounted on an elephant; Vaifhnavi borne by an eagle; Mahefwari riding on a bull; Kaumari conveyed by a peacock; Brahmi carried by a fwan; and Aparajita revered by the univerfe, are all Matris endowed with every faculty."

The probability of thefe and fimilar Puranic legends having been the origin of thofe of Aphrodite, Europa, and Leda, is above hinted. A farther confideration of the paffages quoted might lead to a belief of greater identity in the mythology of the eaftern and weftern heathens. A virgin goddefs conveyed by a peacock, a hundred-eyed deity, and one borne by an eagle, are common to both. Other points of uniformity will occur to the claffical reader.

In the thirteenth fection of the firft book of the Ramayana (fee that article), the company affembled at an Afwamedha, or facrifice of a horfe, is enumerated; including, among many other of the heavenly hoft, "the four fupporters of the univerfe, and the divine mothers of all the celeftials." A note on this paffage informs us, that the former are "Indra, regent of the eaft; Yama, of the fouth; Varuna, of the weft; and Kuvera, of the north." (See hereon more particularly under MARUT.) And that the "divine mothers of the celeftials are feven: Brahmi, Mahefwari, Rudri, Kaumari, Vaifhnavi, Varahi, and Indrani."

MATRICARIA, in *Botany*, fo called from its reputed efficacy in difeafes of the matrix. Its Greek fynonym παρθενιον, from παρθενος, *a virgin*, feems to be founded in a fimilar opinion. Linn. Gen. 432. Schreb. 565. Willd. Sp. Pl. v. 3. 2161. Mart. Mill. Dict. v. 3. Sm. Fl. Brit. 902. Ait. Hort. Kew. ed. 2. v. 3. 233. Juff. 183. Lamarck Illuftr. t. 678. Gærtn. t. 168.—Clafs and order, *Syngenefia Polygamia Superflua*. Nat. Ord. *Compofitæ Difcoideæ*, Linn. *Corymbiferæ*, Juff.

Gen. Ch. *Common calyx* hemifpherical, compofed of linear, imbricated, nearly equal, membranous fcales. *Cor.* compound, radiated; florets of the difk all perfect, tubular, funnel-fhaped, five-cleft, fpreading; thofe of the radius female, oblong and three-toothed. *Stam.* (in the tubular florets) Filaments five, capillary, very fhort; anthers cylindrical, tubular. *Pift.* (in the tubular florets) Germen oblong, naked; ftyle thread-fhaped, the length of the ftamens; ftigma cloven, fpreading; the female or ligulate florets differ in having rather a fhorter ftyle, and two revolute ftigmas. *Peric.* none, except the permanent calyx. *Seeds* in all the florets folitary, oblong. *Down* none. *Recept.* naked, cylindrical or conical.

Obf. This genus differs from *Pyrethrum* in having no *crown* or *pappus* attached to the feed.

Eff. Ch. Receptacle naked, almoft cylindrical. Seeds without a crown. Calyx depreffed, imbricated with membranous bordered fcales.

1. M. *fuaveolens*. Sweet Feverfew. Linn. Sp. Pl. 1256. (M. recutita; Linn. Sp. Pl. ed. 1. 891. Fl. n. 701; Fl. Suec. ed. 1. 251, without the fynonyms.)—"Receptacle conical. Florets of the radius deflexed. Calyx-fcales equal at the margin."—Native of Sweden, but of what country befides is uncertain, this being a very obfcure fpecies, much miftaken by authors. The Linnæan herbarium throws no certain light upon it. What Ehrhart has given in his *Plantæ Officinales* 58, as *Matricaria Chamomilla*, feems rather to anfwer to the defcription of the fpecies in queftion.

2. M. *Chamomilla*. Corn Feverfew, or Wild Chamomile. Linn. Sp. Pl. 1256. Engl. Bot. t. 1232. Curt. Lond. fafc. 5. t. 63. Mart. Fl. Ruft. t. 74.—Leaves fmooth, pinnated; leaflets linear, fimple or divided. Radius fpreading. Scales of the calyx dilated.—Very common in the neighbourhood of London, in fields and on dunghills by the road fide, flowering from May to July.—*Root* annual, fibrous. *Stem* a foot high, erect, very much branched, leafy, ftriated, fmooth. *Leaves* feffile, pinnated, clafping the ftem, of a deep green, fmooth; leaflets linear, obtufe with a little point. *Flowers* numerous, terminal, folitary, refembling thofe of the Chamomile of the fhops (*Anthemis nobilis*) in fize, and, in a certain degree, in fmell. *Calyx* flattifh, fmooth; fcales dilated outwardly, membranous, whitifh. *Difk* yellow, conical. *Florets of the radius* fpreading, white, retufe, three-toothed, deflexed in the evening. *Seeds* angular, oblique, fmooth, altogether beardlefs. *Receptacle* conically cylindrical, acute, dotted, fmooth.

Hudfon and Lightfoot were of opinion that M. *fuaveolens* of Linnæus was only a variety of this fpecies, but Dr. Smith in his *Flora Britannica* fays they are diftinct, the former being never found in Britain, and having its flowers not more than half as large as in the latter.—Profeffor Martyn obferves that "according to the Swedifh obfervations, kine, goats and fheep eat this plant, horfes are not fond of it, and fwine refufe it. It feems to be rejected in general by all quadrupeds with us. It is fuppofed to poffefs the

the fame qualities with *Anthemis nobilis*, but in an inferior degree."

Willdenow has adopted a third fpecies, M. *capenfis*, on the authority of Thunberg's *Prodromus* and Linnæus's *Mantiffa*; but on referring to the Linnæan Herbarium, we find its feeds furnifhed with a crown, fo that it muft of courfe be removed to *Pyrethrum*. For the fame reafon M. *Parthenium*, and *maritimum* have been placed under that genus.

Matricaria, in *Gardening*, comprehends plants of the hardy, herbaceous, perennial kind, of which the fpecies cultivated is the common feverfew (M. parthenium).

It has feveral varieties, as with full double flowers, with double flowers, having the florets of the ray plane, of the difk fiftular; with very fmall rays; with very fhort fiftular florets; with naked heads, having no rays; with naked fulphur-coloured heads, and with elegant curled leaves.

Method of Culture.—The plants of this fpecies may be raifed from feeds, by parting the roots, and by cuttings.

In the firft mode the feeds fhould be fown in the fpring, as about March, upon a bed of light earth, and when they are come up, planted out into nurfery-beds, at about eight inches afunder, where they may remain till the middle of May; when they fhould be taken up, with a ball of earth to their roots, and planted in the middle of large borders, or other parts for flowering. But they fhould not be permitted to feed, as it often weakens and decays the roots; therefore, when their flowers are paft, their ftems fhould be cut down, which will caufe them to pufh out frefh heads, whereby the roots may be better preferved.

MATRICE, or Matrix. See Matrix.

Matrice, or *Matrix*, in *Dyeing*, is applied to the five fimple colours, whence all the reft are derived or compofed. Thefe are the black, white, blue, red, and yellow or root-colour. See Dyeing.

Matrice, or *Matrices*, ufed by the *Letter-founders*, are thofe little pieces of copper or brafs, at one end whereof are engraven, dent-wife, or *en creux*, the feveral characters ufed in the compofing of books.

Each character, virgula, and even each point, in a difcourfe, has its feveral matrix; and, of confequence, its feveral puncheon to ftrike it. They are the engravers on metal that cut or grave the matrices.

When types are to be caft, the matrice is faftened to the end of a mould, fo difpofed, as that when the metal is poured on it, it may fall into the creux or cavity of the matrice, and take the figure and impreffion thereof. See *Letter*-Foundery.

Matrices, ufed in *Coining*, are pieces of fteel, in form of dyes, whereon are engraven the feveral figures, arms, characters, legends, &c. wherewith the fpecies are to be ftamped.

The engraving is performed with feveral puncheons, which being formed in relievo, or prominent, when ftruck on the metal, make an indented impreffion, which the French call *en creux*. See the manner hereof under Engraving *on fteel*. See alfo Coining.

MATRICULA, a regifter kept of the admiffion of officers, and perfons entered into any body or fociety whereof a lift is made. Hence thofe who are admitted into our univerfities are faid to be matriculated.

Among ecclefiaftical authors, we find mention made of two kinds of matriculæ; the one containing a lift of the ecclefiaftics, called *matricula clericorum*; the other of the poor fubfifted at the expence of the church, called *matricula pauperum*.

Matricula was alfo applied to a kind of alms-houfe, where the poor were provided for. It had certain revenues appropriated to it, and was ufually built near the church; whence the name was alfo frequently given to the church itfelf.

MATRIMONY. See Espousals, and Marriage.

MATRIX, in *Anatomy*, the womb, or that part of the female of any kind, wherein the fœtus is conceived, and nourifhed till the time of its delivery. See Womb, Uterus, Fœtus, &c.

Matrix, *Bearing down of*, in *Surgery*. See Prolapsus.

Matrix, *Polypi of*. See Polypus.

Matrix, *Retroverfion of*. See Retroversion.

Matrix, *Suffocation of the*. See Suffocation.

Speculum Matricis. See Speculum.

Matrix is alfo applied to places proper for the generation of vegetables, minerals, and metals.

Thus, the earth is the matrix wherein feeds fprout; and marcafites are by many confidered as the matrices of metals.

The matrix of ores is the earthy and ftony fubftances in which thefe metallic metals are enveloped: thefe are very various, frequently fpar, quartz, fluors, or hornblende.

Matrix *Succini*, in *Natural Hiftory*, a name given by Hartman, and fome other authors, to a fort of fubftance refembling foffil wood, or the barks of trees, common in the cliffs of the fhores of the Baltic, and found in digging all over Pruffia. This is the bed in which the foffil amber of that kingdom is lodged, and it is fuppofed to have no fmall fhare in the production or formation of that foffil. The workmen who dig for amber always make this their guide, and follow the veins of it, never fearching any where elfe for the amber.

The foffil wood, which is truly fuch, and has been once vegetable matter, whatever part of the world it is found in, agrees in the fame general marks of diftinction; and knots, and other evident proofs of its having been once vegetable, are found in all of it; but this matrix of amber, whether found in Pruffia, Denmark, or elfewhere, is ftill of the fame kind, and fhews none of thefe characteriftic marks of wood. However, notwithftanding all this, it is faid, that on opening the ditches for the fortifications at Copenhagen, feveral large maffes of amber were found, all of them adhering to the fides of large bodies of trees, which were black as ebony. The pieces are preferved in the cabinet of the king of Denmark, in that place, and fome of them weigh forty or fifty ounces. This is an additional circumftance to the common obfervation of fomething refembling wood being always found where amber is, and deferves to be confidered, as it tends to overthrow the prefent received fyftem of amber being originally a mineral production.

Dr. Fothergill, in his Effay upon the Origin of Amber, maintains, that it is a vegetable refin, the product, perhaps, of the fir or pine kind; and that it is changed into its prefent form by a mineral acid. In proof of its refinous nature, he alleges its afpect, texture, and form: befides, the bodies inclofed in it are moftly animals of the flying kind, few reptiles, except fuch as ants, fpiders, &c. which are found in trees, and fcarcely ever any aquatics; and this could not happen in the fea, nor in the earth, but upon its furface. He apprehends, likewife, that this refin, with the trees which afforded it, were buried in the earth by the deluge, or fome violent convulfion of the fame kind: to which purpofe he obferves, that the fubftance of which the proper veins of amber confift, hath feveral genuine characteriftics of wood ftill remaining; the texture of amber, which is fibrous, and, when dried,

dried, capable of swimming in water, and burning like other wood, shews, he says, what it hath been. Nor is the amber disposed in these veins in one continued stratum; but lumps of it are irregularly disseminated through the whole of the supposed woody mass. The change which this wood undergoes, is produced partly by time, and completed by the vitriolic mineral acid of the earth. Such an acid, it is argued, is present wherever amber occurs in its proper matrix, and is sometimes found in the amber itself. The acid of the salt of amber is vitriolic; and common turpentine affords, by proper management with a vitriolic acid, a considerable portion of the same chemical principles that amber does; and those pieces of amber which have been found soft and imperfect, are nearly related to a vegetable resin. Phil. Transf. vol xlii. N 472. p. 21.

Matrix is also applied figuratively to several things wherein there appears a kind of generation, and where certain things seem to acquire a new being, or at least a new manner of being. Of which kind are the moulds wherein the printers' types, or letters, are cast; and those used in striking money and medals, in coining. See Matrice.

MATRON, Matrona, among the Romans, signified a married woman, and sometimes also the mother of a family. There was, however, some difference between *matrona* and *mater-familias*. Servius says, that some imagined the difference to lie in this, that *matrona* was a woman who had one child, and *mater-familias* one that had several. But others, particularly Aulus Gellius, take the name *matrona* to belong to a married woman, whether she had any children or not; the hope and expectation of having them being enough to warrant the title of mother, *matrona*, and for this reason it is, that marriage is called *matrimony*. This opinion is supported by Nonius.

Matron *of an Hospital*. See Hospital.

Matrons, *Jury of*, is a jury of twelve discreet women, directed by the judge to enquire into the fact when a woman is capitally convicted, and pleads her pregnancy. This plea, though it cannot be made in stay of judgment, may be urged in respite of execution. If the jury bring in their verdict quick with child, execution shall be staid generally to the next session; and so from session to session, till either the woman is delivered, or proves, by the course of nature, not to have been with child at all. But if she once hath had the benefit of this reprieve, and been delivered, and afterwards becomes pregnant again, she shall not be entitled to the benefit of farther respite for that cause; for she may now be executed before the child is quick in the womb, and shall not, by her own incontinence, evade the sentence of justice.

If a widow feigns herself with child, in order to exclude the next heir, and a supposititious birth is suspected to be intended, then upon the writ *de ventre inspiciendo*, a jury of women is to be impanelled to try the question; Whether with child or not?

MATRONALIA, feasts of the Roman ladies, or rather matrons, celebrated on the calends of March, in honour of the god Mars.

Ovid mentions many reasons for the institution of this feast; but the principal seems to have been the peace concluded between the Romans and Sabines, by the mediation of the women. The women granted to their servants on this occasion the same privileges which were granted to the slaves by their masters in the Saturnalia.

No men living in celibacy were allowed to assist at the feast.

MATROSSES, soldiers, in the train of artillery, next below the gunners, and properly apprentices or assistants to them: their duty is to assist the gunner in traversing, spunging, loading, and firing of guns, &c. They carry fire-locks, and march along with the guns and store-waggons, both as a guard, and to help in case of emergency.

MATRUNGA, in *Geography*, a town of Hindoostan; 37 miles N.E of Ruttunpour.

MATSCHACH, a town of the duchy of Carinthia; 10 miles S. of Luxemburg.

MATSCHEN, a town of Saxony, in the circle of Leipsic; 6 miles N. of Leissnich.

MATSCHEVIZ, a town of the duchy of Warsaw, memorable for a battle fought in 1794, between the confederate Poles, under Kosciusko, and the Russians, under general Fersan, in which the latter were victorious; 600 Poles fell, and 16,000 were made prisoners. All the artillery fell into the hands of the Russians, and only 1500 men escaped. Kosciusko, who was taken prisoner, was severely wounded, and very nearly lost his life: 32 miles E. of Warsaw.

MATSIMA, or Schilpads, an island of Japan, E. of Niphon. N. lat. 38 12'.

MATSINGLO, a town on the W. coast of the island of Luçon. N. lat 15 38' E long. 120° 12'.

MATSUAH See Masowah.

MATSUNAY, a sea-port of the island of Jedso, tributary to Japan. N. lat 40 40'. E. long. 138 44'.

MATSYAVATARA, in *Hindoo Mythology*, is the first of the ten chief incarnations of the god Vishnu. This *avatara* was in the form of a *fish*, which is the meaning of the words, and it has been proved to have immediate reference to the deluge, and to be the same history, disguised in oriental fiction, of that event, as related in our scriptures. Sir W. Jones (Asiatic Researches, vol. i.) assents to the opinion of Bochart, that the fable of Saturn was raised on the true history of Noah; he shews that the seventh Menu of the Hindoos, named Satyavrata, in whose days this avatara is related to have taken place, corresponds in station and character with our patriarch. (See Menu and Satyavrata.) In his reign the Hindoos believe the whole earth to have been destroyed by a flood, including all mankind, who had become corrupt, except the pious prince himself, the seven Rishis, and their several wives, who, by command of Vishnu, entered a spacious vessel, accompanied by pairs of all animals. (See Rishi.) Vishnu, assuming the form of a fish, commanded the ark to be fastened by a cable, formed of a vast serpent, to his stupendous horn; secured thereby till the flood subsided; when he and Brahma slew a monster named Hyagriva, or the horse-necked, who, while Brahma was reposing at the end of a kalpa (see Kalpa), stole the Vedas, and mankind had consequently fallen into the depths of ignorance and impiety. The Vedas having been recovered, (see Veda,) the world was progressively re-peopled with pious inhabitants, descendants of the devout Satyavrata and his favoured companions. As Nuh, the true name of our patriarch Noah, may be easily deduced from Menu, so Adam may from *adim*, meaning, in the Sanskrita language, *first*; tending, as is evidently sir W. Jones's opinion, to the conclusion that the first and last of the seven Menus can be no other than the great progenitor and restorer of our species. The history of the avatara under discussion is the subject of the first Purana, or sacred poem, consisting of 14,000 stanzas, (see Purana,) and is concisely told in the eighth book of the Sri Bhagavata, or life of Krishna. See those articles, also Kurmavatara, for a brief account of the second incarnation of Vishnu.

MATSYS, Quintin, in *Biography*, known by the name of the blacksmith of Antwerp, because he followed that employment till he was 20 years old, when he became a painter,

painter, and arrived at great perfection in the dry ftyle of the time in which he lived.

He was born in 1460, and is faid to have been excited by love to exchange his heavy iron labours for the fofter and more engaging charms of the pencil. Whatever were his motives, it was fortunate that he did devote his mind to that purfuit, as he poffeffed uncommon talents, and exerted them with great induftry. His exertions were confined to fubjects of common and vulgar life, to which he gave confiderable intereft, by his attention to expreffion, and his fkill in rendering it The beft inftance we have in this country is his excellent picture of the two mifers in Windfor caftle, of which there is a duplicate by him in poffeffion of lord Lyttelton at Hagley in Worcefterfhire. He died in 1529, aged 69.

MATT. The produce of the firft fufion of a fulphuretted ore is called a *matt*, a term probably adopted from the German miners; for the word in that language fignifies dull, without luftre, a character that is applicable with great juftice to moft of the half fulphurized regu i when compared to the fame metals in their pure ftate.

MATTA DE BRAZIL, in *Geography*, a populous town of Brazil, in the government of Pernambuco; 25 miles W. of Olinda: from its vicinity great quantities of Brazil wood are fent into Europe.

MATTADEQUN CREEK, a river of Virginia, which runs into York river, N. lat. 37° 40′. W. long. 77° 20′.

MATTADORE. See OMBRE.

MATTAGESS, in *Ornithology*, the Englifh name of the largeft fpecies of the *lanius*, or butcher-bird.

The word *mattagefs* is borrowed from the Savoyards, and fignifies the murdering pye; and has been given it from its favage difpofition, and its refemblance to the magpye in the fhape of its tail See LANIUS *Excubitor*.

MATTAPONY, in *Geography*, a river of Virginia, navigable 70 miles above its mouth; it rifes in Spotfylvania county, and purfuing a S.E. courfe, joins Pamunky below the town of Delawar, and forms with it York river.

MATTARELLA, a town of Italy, in the duchy of Spoleto; eight miles N.E. of Terni.

MATTATHIAS, in *Biography*, a Jewifh prieft, founder of the family of Maccabees, was defcended from one of the twenty-four appointed by David to officiate in the temple, and was of the branch of the Afmoneans. The perfecution of his countrymen, and profanation of their religion by Antiochus Ephiphanes, were fo grievous to him, that he retired from Jerufalem to his native place, to avoid the fight. One of the king's officers, named Apelles, coming thither to enforce his mafter's commands, affembled the people, with Mattathias and his five fons, and endeavoured to perfuade them to compliance, but the zealous and patriotic prieft loudly declared, that although the whole nation abandoned the religion of their fathers, he and his houfe would continue faithful to their God. His zeal carried him much farther than a mere affertion of his pious conftancy; he put in practice an injunction of the Mofaic law, by actually killing on the fpot a Jew who prefented himfelf to facrifice at the altar of an idol At the fame inftant, he fell upon, and flew the king's officer, and his attendants, overthrew the idol, and ran through the city, calling upon all who were attached to their law to follow them. They quickly found themfelves at the head of a confiderable body of men; and having confulted together as to the lawfulnefs of fighting on the fabbath-day, it was agreed not only to be lawful but obligatory to refift an attack from their enemies, and the enemies of their religion on the fabbath. They inftantly became aggreffors, and marched from city to city; overthrew the altars of idolatry, and reftored the worfhip of the true God, Mattathias caufed all the prifoners taken from the apoftates to be put to death without mercy or compunction. Thus fuccefsfully did he commence that revolt which was productive of fo many great events under his fons Simon, Judas, and Jonathan, and perceiving his own end approaching, he gave a moft folemn exhortation to his fons to live in unity, and purfue with zeal and courage the courfe they had entered upon. He died in 166 B.C., leaving behind him the character of a valiant and faithful afferter of the religion and liberties of his country. Univer. Hift. Prideaux. vol. ii.

MATTEI, SAVERIO, a Neapolitan lyric poet, and mufical critic; long in correfpondence with Metaftafio, an eminent Hebraift, and tranflator of the pfalms into Italian verfe; calculated for the reception of mufic in every form of cantata, duet, trio, and chorus. He was in clofe friendfhip with Jomelli, whofe famous Mifrere, for two voices, was compofed to his verfion. He manifefted his great regard for the admirable mufician Jomelli, by affifting Ginnaro Manna in the arrangement and execution of a plan for his public funeral. in 1774; furnifhing an example to pofterity of the gratitude due to great talents, and a ftimulus to young artifts to merit equal honours. The learned Mattei has given an account of this public funeral, and of the works of the great mufician, in his "Saggio di Poefie Latine ed Italiane," publifhed at Naples, immediately after the melancholy event.

MATTEIS, NICOLA, a Neapolitan performer on the violin, who arrived in England in the latter end of Charles II.'s reign, and was one of the firft great players upon that inftrument, who fettled in London.

A general paffion for the violin, and for pieces exprefsly compofed for it, as well as a tafte for Italian mufic, feem to have been excited in our country about this time, when French mufic and French politics became equally odious to a great part of the nation.

In MS. memoirs of mufic, by the Hon. Roger North, brother of the lord Keeper North, to which we have had accefs, there is a curious and characteriftic account of this mufician; in which we are told "that the decay of French mufic, to which Charles was fo partial, in favour of the Italian, came on by degrees Its beginning was accidental, and occafioned by the arrival of Nicola Matteis. He was an excellent mufician, and performed wonderfully on the violin. His manner was fingular; but he excelled, in one refpect, all that had been heard in England before: his *arcata*, or manner of bowing, his fhakes, divifions, and, indeed, his whole ftyle of performance, were furprifing, and every ftroke of his bow was a mouthful.

"All that he played was of his own compofition, which manifefted him to be a very exquifite harmonift, and of a boundlefs fancy and invention. And by all that I have been able to obferve of his abilities, or to hear concerning thofe of other performers on the violin, none but Corelli feems to have furpaffed him.

"When he firft came hither he was very poor, but not fo poor as proud; which prevented his being heard, or making ufeful acquaintance for a long time, except among a few merchants in the city, who patronized him. And fetting a high value on his condefcenfion, he made them indemnify him for the want of more general favour.

"By degrees, however, he was more noticed, and was introduced to perform at court. But his demeanor did not pleafe, and he was thought capricious and troublefome; as he took offence if any one whifpered while he played, which was a kind of attention that had not been much in fafhion at our court. It was faid that the duke of Richmond would

have

have settled a pension upon him, though he wished him to change his manner of playing, and would needs have one of his pages shew him a better. Matteis, for the sake of the jest, condescended to take lessons of the page, but learned so fast, that he soon out-ran him in his own way. But he continued so outrageous in his demands, particularly for his solos, that few would comply with them, and he remained in narrow circumstances and obscurity a long while.

"Nor would his superior talents ever have contributed to better his fortune, had it not been for the zeal and friendly offices of two or three dilettanti, his admirers. These were Dr. Walgrave, a prodigy on the arch-lute; sir Roger L'Estrange, an expert violist; and Mr. Bridgman, the under-secretary, who accompanied well on the harpsichord. These becoming acquainted with him, and courting him in his own way, had an opportunity of describing to him the temper of the English, who, if humoured, would be liberal; but if uncivilly treated, would be sulky and despise him and his talents. Assuring him that by a little complaisance he would neither want employment nor money.

"By advice so reasonable, they at length brought him into such good temper, that he became generally esteemed and sought after; and having many scholars, though on moderate terms, his purse filled apace, which confirmed his conversion.

"After this, he discovered a way of acquiring money, which was then perfectly new in this country. For observing how much his scholars admired the lessons he composed for them, which were all duos, and that most musical gentlemen who heard them, wished to have copies of them, he was at the expence of having them neatly engraved on copper-plates, in oblong octavo, which was the beginning of engraving music in England; and these he presented, well bound, to lovers of the art and admirers of his talents, for which he often received three, four, and five guineas. And so great were his encouragement and profits in this species of traffic, that he printed four several books of 'Ayres for the Violin,' in the same form and size."

He printed lessons likewise for the guitar, of which instrument he was a consummate master, and had so much force upon it, as to be able to contend with the harpsichord, in concert.

Another book of his writing was designed to teach composition, ayre, and thorough base. Of this work, though it was printed, but few copies are subsisting. His full pieces, concertos, and solos, were never published, and are very scarce, if at all to be found.

The two first of the four books mentioned above, of which many copies were dispersed, consist of preludes, allemands, sarabands, courants, gigues, divisions on grounds, and double compositions fitted to all hands and capacities. The third book has for title, Ayres for the Violin, to wit: preludes, fugues, allemands, sarabands, courants, gigues, fancies, divisions, and likewise other passages, introductions, and fugues, for single and double stops; with divisions somewhat more artificial for the improvement of the hand, upon the base-viol or harpsichord. The fourth book is entitled, Other Ayres and Pieces, for the violin, base-viol, and harpsichord, somewhat more difficult and artificial than the former; composed for the practice and service of greater masters upon those instruments.

Mr. North observes, that while the lovers of music were becoming acquainted with his manner of playing from his own books, which often happened in large assemblies, no one pretended to do the like; for none could command that fulness, grace, and truth, of which he was master. So that, in his own time, his compositions were thought impracticable from their difficulty; and since, as they were never thrown into the shops, they have been but little known. So that at present, now the instrument is so much advanced, no one can have the least idea of these pieces having ever been difficult, who was not a witness of his own manner of playing them. Indeed, his books, well studied, are a sufficient rudiment of artful composition.

Another observation of this speculative dilettante is, that "in a numerous assembly, when Matteis alone was to entertain the company, having his friends Walgrave, L'Estrange, and Bridgman about him, and flaming with good humour and enthusiasm, he has seized on the attention of the whole audience with such force and variety, as to prevent even a whisper for more than an hour together, however crowded the room."

After this, it is easy to imagine that his reputation and abilities would enable him to accumulate wealth, or to live in splendour: he chose the latter, took a great house, and indulging appetite, lived so luxuriously, that he brought on diseases which soon put an end to his existence.

He left a son, Nicola Matteis, whom he taught on the violin from his cradle. "I have seen the boy in coats," says Mr. North, "play to his father's guitar. When he grew up he became a celebrated master on the violin, in London, for several years. Being invited into Germany, he went to Vienna, and has continued there ever since, in full payment for all the masters we have received from those countries."

The younger Matteis must have returned to England soon after Mr. North's Memoirs of Music were written; as we remember to have seen him at Shrewsbury, where he was settled as a language-master as well as performer on the violin in 1737. We afterwards learned French and the violin of this master, who continued at Shrewsbury till his decease, about the year 1749. He played the solos of Corelli with more simplicity and elegance than any performer we ever heard.

According to Walther, his name appeared in the Vienna calendar, as one of the emperor's band of violins in 1721 and 1727. In Roger's Catal. of Music, five different works appear under the title of "Arie cantabile à Violino solo Violoncello e basso continuo." This seems to have been the younger Matteis, of whom the Hon. Mr. North speaks.

MATTELOY, in *Geography*, a town of Hindoostan, in Canara; two miles from Nelluram.

MATTER, a town of Tunis, anciently called "Oppidum Matterense;" 27 miles N.W. of Tunis.

MATTER, *materia*, *body*, or an extended, solid, divisible, moveable, and passive substance, the first principle of all natural things, from the various arrangements, and combinations whereof all bodies are formed.

Aristotle makes three principles, matter, form, and privation: which last the Cartesians throw out of the number, and others the two last.

The properties of matter we are pretty well acquainted with, and can reason about its divisibility, solidity, &c. but the subject in which these properties reside, or their substratum, is still a mystery. Aristotle speaks very darkly on the subject, defining matter to be *nec quid*, *nec quantum*, *nec quale*, nor any certain determinate thing at all; which many of his followers interpret so as to believe, that matter does not at all exist. The Cartesians make the essence of matter to consist in extension; arguing, that since the properties above-mentioned are all that are essential to matter, some of them must constitute its essence; and, since extension is conceived prior to all the rest, and is that without which none of the rest can be conceived, extension is that which constitutes

ſtitutes the eſſence of matter. But the concluſion here is unjuſt; for, on his principle, the exiſtence of matter, according to Dr. Clarke, would have the faireſt title to conſtitute its eſſence, the *exiſtere* being conceived prior to all properties, and even to extenſion. Since, then, the word extenſion appears to go farther, and to be more general, than matter, that impenetrable ſolidity, which is eſſential to all matter, and to matter alone, and from which all its properties manifeſtly flow, may, with more propriety, be called the *eſſence* of matter.

Again, if extenſion were the eſſence of matter, and ſo matter and ſpace the ſame thing, it would follow, that matter is infinite and eternal, that it is a neceſſary being, and could neither be created nor annihilated; which is abſurd. Beſides, it appears, both from the nature of gravity, the motions of comets, the vibrations of pendulums, &c. that ſpace is not matter; and therefore it is not extenſion, but ſolid, impenetrable extenſion, which has a power of reſiſting, that conſtitutes matter.

Many among the old philoſophers maintained the eternity of matter; out of which they ſuppoſed all things to be formed by the hands of nature; as being unable to conceive how any thing ſhould be formed out of nothing. Plato maintained, that matter had exiſted eternally, and concurred with God in the production of all things, as a paſſive principle, or a kind of collateral cauſe.

Matter and form, the two ſimple and original principles of all things, according to the ancients, compoſed ſome ſimple natures, which they called *elements;* out of the various combinations whereof all natural things were afterwards compoſed.

Dr. Woodward ſeems of an opinion not very unlike this, *viz.* that matter is originally and really very different, being at its firſt creation divided into ſeveral ranks, ſets, or kinds, of corpuſcles, differing in ſubſtance, gravity, hardneſs, flexibility, figure, ſize, &c. from the various compoſures and combinations of which, he thinks, ariſe all the varieties in bodies, as to colour, hardneſs, gravity, taſtes, &c. But ſir Iſaac Newton takes all thoſe differences to reſult from the various arrangements of the ſame matter; which he judges to be homogeneous and uniform in all bodies.

Beſides the properties of matter formerly known, ſir Iſaac Newton has diſcovered a new one; *viz.* "That of attraction, or that every particle of matter has an attractive power, or a tendency towards every other particle: which power is ſtrongeſt in the point of contact, and ſuddenly decreaſes, inſomuch that it acts no more at the leaſt ſenſible diſtance; and, at a greater diſtance, is converted into a repellent force, whereby the parts fly from each other." On this principle of attraction, he accounts for the cohefion of the particles of bodies, which is otherwiſe inexplicable.

For he takes occaſion to obſerve, "That all bodies ſeem to be compounded of hard particles, even light itſelf, and all other the moſt volatile of fluids; inſomuch that hardneſs may be eſteemed a property of all uncompounded matter; at leaſt, the hardneſs of matter ſtands on as good a footing as that of its impenetrability; all the bodies we know of being either hard themſelves, or capable of being hardened. Now, if compound bodies be ſo hard, as we find ſome of them, and yet if they are very porous, and conſiſt of parts which are only laid together, the ſimple particles, which are void of pores, and were never yet divided, muſt be much harder. Now, ſuch hard particles being heaped together, can ſcarce touch one another in more than a few points; and therefore they muſt be ſeparable with much leſs force than is requiſite to break a ſolid particle, whoſe parts touch in all the ſpace, without any pores or interſtices to weaken their cohefion. How then ſhould ſuch very hard particles, only laid together, and touching only in a few points, ſtick together, and that ſo firmly as they do, without the aſſiſtance of ſomething that cauſes them to be attracted or preſſed towards each other?"

The ſame great author obſerves farther, "That the ſmalleſt particles may cohere by the ſtrongeſt attractions, and compoſe bigger particles of weaker virtue; and many of theſe may cohere, and compoſe ſtill bigger particles, whoſe virtue is ſtill weaker, and ſo on for divers ſucceſſions, until the progreſſion end in the biggeſt particles; on which the operations in chemiſtry, and the colours of natural bodies depend, and which, by cohering, compoſe bodies of a ſenſible magnitude. If the body is compact, and bends or yields inward to preſſion, without any ſliding of its parts, it is *hard* and *elaſtic,* returning to its figure with a force ariſing from the mutual attraction of its parts. If the parts ſlide from one another, the body is *malleable* or ſoft. If they ſlip eaſily, and are of a fit ſize to be agitated by heat, and the natural heat is great enough to keep them in agitation, the body is *fluid;* and, if it be apt to ſtick to things, it is *humid.* And the drops of every fluid affect a round figure by the mutual attraction of their parts, as the globe of the earth and ſea affects a round figure, by the mutual attraction of the gravity of its parts."

Again, "Since metals, diſſolved in acids, attract but a ſmall quantity of the acid, their attractive force reaches but to a ſmall diſtance. Now, as in algebra, where affirmative quantities ceaſe, there negative ones begin; ſo in mechanics, where attraction ceaſes, there a repulſive virtue muſt ſucceed. That there really is ſuch a virtue, ſeems to follow from the reflections and inflections of the rays of light; the rays being repelled by bodies in both theſe caſes, without the immediate contact of the reflecting or inflecting body. The ſame thing ſeems alſo to follow from the emiſſion of light; a ray, as ſoon as ſhaken off from a ſhining body by the vibrating motion of the parts of the body, and got beyond the reach of attraction, being driven away with exceeding great velocity: for that force, which is ſufficient to turn it back in reflection, may be ſufficient to emit it. It ſeems alſo to follow, from the production of air and vapour; the particles, when they are ſhaken off from the body by heat or fermentation, ſo ſoon as they are beyond the reach of the attraction of the body, receding from it, and alſo from one another, with great ſtrength, and keeping at a diſtance, ſo as ſometimes to take up above a million of times more ſpace than they did before in the form of a denſe body; which vaſt contraction and expanſion ſeems unintelligible, by feigning the particles of air to be ſpringy and ramous, or rolled up like hoops, or by any other means than a repulſive power. The particles of fluids, which do not cohere too ſtrongly, and are of ſuch a ſmallneſs, as renders them moſt ſuſceptible of thoſe agitations which keep liquors in a fluor, are more eaſily ſeparated and rarefied into vapour, *i. e.* in the language of the chemiſts, they are *volatile;* rarefying with an eaſy heat, and condenſing again with cold. But thoſe which are groſſer, and ſo are leſs ſuſceptible of agitation, or which cohere by a ſtronger attraction, are not ſeparated without a ſtronger heat, or perhaps not without fermentation. And theſe laſt are the bodies which chemiſts called *fixed;* and yet theſe, being rarefied by fermentation, become true permanent air; thoſe particles receding with the greateſt force, and being moſt difficultly brought together, which, upon contact, cohere the moſt ſtrongly. And becauſe the particles of permanent air are groſſer, and ariſe from denſer ſubſtances than thoſe of vapours; thence it is, that true air is more ponderous

ponderous than vapour; and that a moist atmosphere is lighter than a dry one, quantity for quantity. From the same repelling power it seems to be, that flies walk upon the water without wetting their feet; and that the object-glasses of long telescopes lie upon one another without touching; and that dry powders are difficultly made to touch one another so as to stick together, unless by melting them, or wetting them with water, which, by exhaling, may bring them together; and that two polished marbles, which by immediate contact stick together, are yet difficultly brought so close together as to stick."

He farther observes, "That, all things considered, it seems probable, God, in the beginning, formed matter in solid, massy, hard, impenetrable, moveable particles, of such sizes, figures, and with such other properties, and in such proportion to space, as most conduced to the end for which he formed them; and that these primitive particles, being solid, are incomparably harder than any porous bodies compounded of them; even so very hard as never to wear, and break in pieces: no ordinary power being able to divide what God himself made one in the first creation. While the particles continue entire, they may compose bodies of one and the same nature and texture in all ages; but, should they wear away, or break in pieces, the nature of things depending on them would be changed. Water and earth, composed of old worn particles, and fragments of particles, would not be of the same nature and texture now with water and earth composed of entire particles in the beginning. And, therefore, that nature may be lasting, the changes of corporeal things are to be placed only in the various separations and new associations and motions, of these permanent particles; compound bodies being apt to break not in the midst of solid particles, but where those particles are laid together, and touch in a few points."

It seems farther, "That these particles have not only a *vis inertiæ*, accompanied with such passive laws of motion as naturally result from that force, but also that they are moved by certain active principles, such as is that of gravity, and that which causeth fermentation, and the cohesion of bodies. These principles are to be considered not as occult qualities, supposed to result from the specific forms of things, but as general laws of nature, by which the things themselves are formed; their truth appearing to us by phenomena, though their causes are not yet discovered."

Hobbes, Spinoza, &c. maintain all the beings in the universe to be material, and their differences to arise from their different modifications, motions, &c. Thus matter, extremely subtile, and in a brisk motion, they conceive, may think; and so they exclude all spirits out of the world. See HOBBISM and SPINOZISM.

Dr. Berkeley, on the contrary, argues against the existence of matter itself; and endeavours to prove, that it is a mere *ens rationis*, and has no existence out of the mind. See ABSTRACTION, BODY, and EXISTENCE.

Some late philosophers have advanced a new hypothesis concerning the nature and essential properties of matter. The first person who suggested, or at least published an account of this hypothesis, was M. Boscovich, in his "Theoria Philosophiæ Naturalis," printed at Vienna in the year 1758. He supposes that the whole mass of matter constituting the various bodies of the universe, consists of a very large, but finite number of simple, indivisible, unextended atoms. These atoms, which may be considered as physical points, are endued with repulsive and attractive powers, which operate variously at different distances. In other words, they are surrounded with various spheres of repulsion and retraction, in the same manner as *solid* matter is generally supposed to be. At the least and innermost distances they repel one another, and by diminishing the distances, these repulsive powers are augmented beyond all limits, so as to be sufficient for annihilating the greatest velocity, and for preventing the actual contact of the primary atoms of matter. At sensible distances the force, which was repulsive, becomes attractive, and decreases, sensibly, as the squares of the distances increase, so as to constitute universal gravity, and to extend beyond the sphere of the most distant limits. But between the supposed innermost repulsive force and the outermost attractive force, at insensible distances, many changes or varieties of force, and consequent determination to motion, occur; the repulsive force being diminished as the distance is augmented. The repulsive force becomes wholly extinct at a certain distance: but on increasing this distance, attraction begins, increases, becomes less, and vanishes; and when the distance is still greater, the force becomes repulsive, increases, lessens, and vanishes as before. Changes of the kind now mentioned occur at insensible distances, sometimes more rapidly, sometimes more slowly; and sometimes one kind of force may become extinct and recover its appropriate state without passing to the other kind. For all these variations the different distances, though insensible to us, afford sufficient scope, as the least part of space is divisible *in infinitum*. Our author's assumed atoms possess, besides these repulsive and attractive forces, that *vis inertiæ* which is admitted to belong to matter by almost all modern philosophers. Our author has illustrated his theory of repulsive and attractive forces by a geometrical curve, varying with a change of distances, which, at first view, appears to be a complicated irregular line; but which Boscovich shews to be regular and uniform, and capable of being expressed by an uniform algebraical equation. But for this part of the subject, the detail of which, so as to render it intelligible, would far exceed our prescribed limits, we must refer to his own work. Nor can we explain at large that law of continuity, by which variable quantities, passing from one magnitude to another, pass through all the intermediate magnitudes, without ever abruptly passing over any of them, and which our author first proves from induction, and then applies to the illustration and establishment of his system. From this law our author infers the impossibility of contact between bodies, and by means of it he explains the interior repulsive forces of his system. Again, from these repulsive forces he deduces the inextension of his atoms; for as this repulsion is common to all matter, it must cause a perfect simplicity in the first elements of body. If these elements were extended, and consequently compounded of particles of an inferior order, these particles might possibly be separated, and then they might meet, and thus an abrupt passage from one velocity to another might take place, which is inconsistent with the law of continuity, previously established. Besides, our author, by rejecting the extension of the first elements of matter, and reducing them, as we have before observed, to mere physical points of attraction and repulsion, precludes all the difficulties that result from continual extension in body, and which have never been satisfactorily obviated. If the elements of matter are extended, each of them may be divided *in infinitum*, and each part may still be divided *in infinitum*. Can this division, it may be questioned, be actually made by the power of God or not? Can there be one *infinite* in number greater than another? Can there be a *compound* without a *simple* of the same kind? These difficulties, it is alleged, do not regard space, which is no real being; but they would regard matter, if it had continued extension. All these perplexities are said to be removed by maintaining, with Bofcovich, that the firft elements of bodies are perfectly fimple, and therefore inextended. But if a particle of matter is not extended, in what refpect does it differ from a point of fpace? M. Bofcovich fays, it is endued with attractive and repulfive forces. But what is it before it is thus endued? Does it then differ from a point of fpace? It is next to impoffible to form any fatisfactory notion of fuch difference. A point of fpace, confidered as an individual, is diftinguifhed from another individual merely by its fituation; it is, therefore, immoveable, but matter is moveable. Have thefe forces, it is very properly afked, which make matter an object of fenfe, any fubftratum, any thing in which they are inherent as qualities? What are the things which thefe qualities diftinguifh from each other as individuals?

With regard to the exterior attractive forces of this fyftem, there can be no queftion; becaufe they conftitute univerfal gravity, the effects of which are conftantly perceptible. But between the interior repulfive and exterior attractive forces, we muft admit many tranfitions from repulfion to attraction, and *vice versâ*, at infenfible diftances, which are indicated to us by cohefion, fermentation, evaporation, and other phenomena of nature. Againft this fyftem, however ingenioufly devifed and ably fupported by the celebrated author, many objections have been urged. That there fhould be no contact between bodies, is an affumption which will not be readily admitted by thofe who have long entertained different ideas on the fubject; and yet Bofcovich himfelf allows, that bodies approach fo near to one another as to leave no fenfible diftance between them, and our fenfes, it muft be acknowledged, are impreffed in the fame manner by his repulfive forces as they would have been by folid bodies themfelves. It has been faid that M. Bofcovich, by denying the extenfion of atoms, annihilates matter; and to this objection we have met with no fatisfactory anfwer. It has been alfo faid, that upon this part of his fyftem, there would be no difference between body and fpirit. By others it has been alleged, that M. Bofcovich's repulfive and attractive forces are like the occult qualities of the Peripatetics; but a fimilar objection has been urged againft Newton's attraction; and it is equally groundlefs, becaufe powers of this kind are fufficiently afcertained by their effects. Some have been indifpofed to admit motion and collifion without immediate impulfe; and it muft be confeffed, that they are not eafily explained and clearly underftoood upon his fyftem. For our author's mode of explaining them, and of applying his fyftem to mechanics, &c. we muft refer to the fecond part of the work already cited. His next object, in the third part, is to account on his fyftem for the general properties of matter. Upon his theory matter is not impenetrable. Provided that any body move with a fufficient degree of velocity, or have fufficient momentum to overcome any power of repulfion that it may meet with, it will find no difficulty in making its way through any body whatever; for nothing will interfere, or penetrate another, but powers, fuch as we know do in fact exift in the fame place, and counterbalance and over-rule one another; a circumftance which never had the appearance of a contradiction, or even of a difficulty. If the momentum of fuch a body in motion be fufficiently great, M. Bofcovich demonftrates, that the particles of any body through which it paffes, will not even be moved out of their place by it. With a degree of velocity fomething lefs than this, they will be confiderably agitated, and ignition might, perhaps, be the confequence; though the progrefs of the body in motion would not be fenfibly interrupted; and with a ftill lefs momentum it might not pafs at all. This theory M. Bofcovich has taken great pains to illuftrate and confirm; fhewing, that it is by no means inconfiftent with any thing that we know concerning the laws of mechanics, or our difcoveries in natural philofophy; and that a great variety of phenomena, particularly thofe which relate to light, admit of a much eafier folution upon this hypothefis than upon any other. The moft obvious difficulty, fays Dr. Prieftley, and, indeed, the only one that attends this hypothefis, as it fuppofes the mutual penetrability of matter, arifes from the difficulty we meet with in attempting to force two bodies into the fame place. But it is demonftrable, that the firft obftruction arifes from no actual contact of matter, but from mere powers of repulfion. This difficulty we can overcome; and having got within one fphere of repulfion, we fancy that we are now impeded by the folid matter itfelf. But the very fame is the apprehenfion of the generality of mankind with refpect to the firft obftruction. Why, therefore, fays he, may not the next refiftance be only another fphere of repulfion, which may only require a greater force than we can apply to overcome it, without difordering the arrangement of the conftituent particles; but which may be overcome by a body moving with the amazing velocity of light?

This fcheme of the mutual penetration of matter firft occurred to Mr. Michell, independently of any communication with M. Bofcovich, on reading Baxter on the "Immateriality of the Soul." He found that this author's idea of matter was, that it confifted, as it were, of bricks cemented together by an immaterial mortar. Thefe bricks, if he would be confiftent in his reafoning, were again compofed of lefs bricks, cemented likewife by an immaterial mortar, and fo on *ad infinitum*. This putting Mr. Michell upon the confideration of the appearances of nature, he began to perceive that the bricks were fo covered with this immaterial mortar, that, if they had any exiftence at all, it could not poffibly be perceived; every effect being produced at leaft in nine inftances in ten certainly, and probably in the tenth alfo, by this immaterial, fpiritual, and penetrable matter. Mr. Michell, finding it neceffary, in order to folve the appearances of nature, to admit of extended and penetrable immaterial fubftance, if he maintained the impenetrability of matter; and obferving farther, that all we perceive by contact, &c. is this penetrable immaterial fubftance, and not the impenetrable one, began to think, that he might as well admit of penetrable material, as penetrable immaterial fubftance; efpecially as we know nothing more of the nature of fubftance than that it is fomething which fupports properties; which properties may be whatever we pleafe, provided they be not inconfiftent with each other, that is, do not imply the abfence of each other. This by no means feemed to be the cafe, in fuppofing two fubftances to be in the fame place at the fame time, without excluding each other; the objection to which is only derived from the refiftance we meet with to the touch, and is a prejudice that has taken its rife from that circumftance. Dr. Prieftley obferves, that if he were to make any alteration in this hypothefis, it would be to fuppofe the force of the fphere of repulfion next to any of the indivifible points, which conftitute what we call folid bodies, not to be abfolutely infinite, but fuch as may be overcome by the momentum of light. If, however, we confider that Mr. Bofcovich makes this neareft power of repulfion not to extend to any real fpace, but to be confined to the indivifible point itfelf, it may appear to be fufficient for the purpofe.

The theory of M. Bofcovich is eafily applicable to the cohefion of atoms, of more compounded particles, and of fenfible bodies. From the cohefion of particles he deduces the extenfion of bodies; becaufe there muft always be fpace between

between the particles. Extenfion, however, according to his fyftem, does not fuppofe the continuity of matter; though we cannot perceive the fmall interval that fubfifts between the conftituent parts of fome bodies, and much lefs the diftance between the fimple elements that compofe them. Figurability refults from extenfion; and denfity from the very different quantities of matter that may be contained under the fame figure and bulk; that body being the moft denfe, which contains in the fame fpace the greateft number of atoms, and *vice verfâ*. But if thefe atoms are mere unextended points, it is not eafy to conceive how any aggregate or combination of them can conftitute a body of any fuppofed denfity. However, our author fuppofes that denfity may be augmented by the nearer approach of the atoms to one another; and of courfe a body of any given magnitude may be divifible beyond any affigned limits. An effential part of mobility in this fyftem confifts in forces, which, at certain diftances, are determinations to motion. Univerfal gravity, which takes place in fenfible diftances, is perfectly intelligible in this fyftem; though our author feems to fuppofe that, when it has extended to the fphere of the limits moft diftant from the fun, it may pafs to repulfion, and again revert to attraction, and form limits of cohefion at the time the fun may be within fuch a limit with regard to the fixed ftars, and our planetary fyftem form only a fmall part of the whole univerfe.

But we are now advanced to the regions of mere conjecture and hypothefis. Our author has further extended his theory to the properties pertaining to diftinct claffes of bodies, fuch as fluidity, folidity, foftnefs and hardnefs, flexibility, elafticity, vifcofity; to the operations of chemiftry; and to the explication of the phenomena of light, electricity and magnetifm, and animal fenfation. Of his ample and various obfervations on thefe fubjects, we can only felect a few particulars. The parts of fluids are eafily feparated, and moved among one another, becaufe they are fpherical and very homogeneous, fo that their forces are directed more to their centre, than to one another, and, of courfe, lefs obftructed in their motions. Some particles are mutually attracted in a very fmall degree, and others more fenfibly, fuch as thofe of water and mercury. The particles of air are feparated by a ftrong force of repulfion, which accounts for the great rarefaction of this fluid. Solid bodies are formed of fubftances of fuch figures, which occafion a greater cohefion than thofe of fluids, fo that they are prevented from moving feparately or round one another: of thefe fome are harder, as their conftituent particles are placed in limits which have ftrong repulfive arches within them, and others, whofe particles have their arches of repulfion weaker, are fofter. Some are flexible, becaufe their particles are placed in limits that have weak arches of repulfion and attraction on each fide: and if thefe arches are fhort, the particles gain more limits of cohefion, and remain bent; but if the arches are longer, the former repulfion and attraction will continue to act and reftore the body to its former pofition; and in doing this with an accelerated velocity, the parts will pafs their former limits, and vibrate backwards and forwards, as is the cafe in a bended fpring: and thus our author accounts for elafticity. Vifcous bodies, having lefs cohefion than folid, and more than fluids, adhere to others in confequence of an attraction which their particles acquire from their compofition. Thus water itfelf adheres to fome bodies, and is repelled by others; which variety is afcribed to the various refpective forces derived from the different compofition of their conftituent particles. In explaining the compofition of organic bodies, the author confiders that particles may be fo formed as to repel fome and attract others, and thus accounts for vegetation, nutrition, and fecretion: and as one particle may attract another in one part only, and repel it in every other fituation, we may hence infer the orderly fituation of the particles in many cryftallizations. The procefs of various chemical operations and their effects are alfo explained by Bofcovich, agreeably to his general fyftem. Light he confiders as an effluvia, emitted with great velocity from luminous bodies by a ftrong repulfion: and he attributes the phenomena of electricity and magnetifm to various attractions and repulfions. Fire he fuppofes to differ from the electrical fluid merely in this circumftance, that fire is an actual fermentation, which is not the cafe with the electrical fluid. In explaining our bodily fenfations, he afcribes what other philofophers attribute to the immediate contact of bodies to attractions and repulfions, which are adapted to caufe that motion in our nerves, that is fuppofed to take place in the organs of fenfation, and to be thence communicated to the brain.

We are happy to be able to clofe this concife and imperfect account of Bofcovich's fyftem with announcing to the philofophers, who may admit or reject it, that he was fully convinced of the neceffity of admitting a felf-exiftent, all-powerful, and intelligent Being, to whom he afcribes the creation of thofe materials that compofe the univerfe, and the arrangements of them in their prefent beautiful form. Indeed, he expreffes his aftonifhment, that any perfon who pretends to the name of a philofopher fhould refift the evidence which the leaft parts of the vifible univerfe afforded in proof of the exiftence of God, as the firft caufe of all. Chance, to which fome have abfurdly attributed the origin of the univerfe, he very juftly confiders as a word without a meaning; nor can he allow that the world has exifted of itfelf in any form like its prefent from all eternity: God alone being eternal and actually infinite. He is alfo a ftrenuous advocate, not only for the principles and duties of natural religion, but for the excellence and benefits of that revelation which God has been pleafed, in great goodnefs, to communicate to mankind.

In conformity to the hypothefis of Bofcovich and Michell, Dr. Prieftley maintains, that matter is not that inert fubftance that it has been fuppofed to be; that powers of attraction or repulfion are neceffary to its very being, and that no part of it appears to be impenetrable to other parts. Accordingly, he defines matter to be a fubftance, poffeffed of the property of extenfion, and of powers of attraction or repulfion, which are not diftinct from matter, and foreign to it, as it has been generally imagined, but abfolutely effential to its very nature and being: fo that when bodies are divefted of thefe powers, they become nothing at all. However, though he fuppofes that thefe powers are effential to the being of matter, infomuch that it cannot exift without them as a material fubftance at all, he by no means maintains that they are felf-exiftent in it; but that from whatever fource thefe powers are derived, or by whatever being they are communicated, matter cannot exift without them; and if that fuperior power or being withdraws its influence, the fubftance itfelf neceffarily ceafes to exift, or is annihilated. Whatever folidity any body has, it is poffeffed of only in confequence of being endued with certain powers, and together with this caufe, folidity, being no more than an effect, muft ceafe. Dr. Prieftley, in another place, has given a fomewhat different account of matter; according to which it is only a number of centres of attraction and repulfion; or more properly of centres, not divifible, to to which divine agency is directed: and as sensation and thought are not incompatible with these powers, solidity, or impenetrability, and consequently a *vis inertiæ*, only, having been thought repugnant to them, he maintains, that we have no reason to suppose that there are in man two substances absolutely distinct from each other. Disquisitions on Matter and Spirit, 1777, passim. See Soul.

Dr. Price, in a correspondence with Dr. Priestley, published under the title of a "Free Discussion of the Doctrines of Materialism and Philosophical Necessity," 1778, has suggested a variety of objections, in our opinion unanswerable, against this hypothesis of the penetrability of matter, and against the conclusions which are drawn from it. The *vis inertiæ* of matter, he says, is the foundation of all that is demonstrated by natural philosophers concerning the laws of the collision of bodies. This, in particular, is the foundation of sir Isaac Newton's philosophy, and especially of his three laws of motion. Solid matter has the power of acting on other matter by impulse; but unsolid matter cannot act at all by impulse: and this is the only way in which it is capable of acting, by any action that is properly its own. If it be said, that one particle of matter can act upon another without contact and impulse, or that matter can, by its own proper agency, attract or repel other matter which is at a distance from it, then a maxim hitherto universally received must be false, that "nothing can act where it is not." Sir Isaac Newton, in his letters to Dr. Bentley, calls the notion, that matter possesses an innate power of attraction, or that it can act upon matter at a distance, and attract and repel by its own agency, an absurdity into which, he thought, no one could possibly fall. And in another place he expressly disclaims the notion of innate gravity, and has taken pains to shew that he did not take it to be an essential property of bodies. By the same kind of reasoning pursued, it must appear, that matter has not the power of attracting and repelling; that this power is the power of some foreign cause, acting upon matter according to stated laws; and that, consequently, attraction and repulsion; not being actions, much less inherent qualities of matter, as such, it ought not to be defined by them. And if matter has no other property, as Dr. Priestley asserts, than the power of attracting and repelling, it must be a non-entity; because this is a property that cannot belong to it. Besides, all power is the power of something; and yet if matter is nothing but this power, it must be the power of nothing; and the very idea of it is a contradiction. If matter is not solid extension, what can it be more than mere extension? Farther, matter that is not solid is the same with pore; it cannot, therefore, possess what natural philosophers mean by the momentum or force of bodies, which is always in proportion to the quantity of matter in bodies, void of pore. Momentum is the cause of resistance, and not *vice versâ*. Moreover, within the sphere of repulsion, the attraction of cohesion takes place; and this is the power which, according to Dr. Priestley, unites the parts of matter, and gives it existence. But, since matter is penetrable, will not this attraction drive all the parts of it into one another, and cause them to coalesce into nothing? This effect must follow, unless there exists, beyond the sphere of attraction, and nearer to matter, a second sphere of repulsion, which again prevents contact. Thus it appears evident, that if a power of attracting acts, it must contract itself into nothing; and that if a power of repulsion acts, it must dissipate itself into nothing. For a farther account of the arguments *pro* and *con* on this subject, we must refer to the work already cited.

Matter, *Ætherial*. See Ætherial.

Matter, *Subtile*. See Materia *Subtilis*.

Matter, *Quantity of*. See Quantity.

Matter *of Deed* signifies a truth to be proved, though not by any record: by which it stands contradistinguished from

Matter *of Record*, which is that which may be proved by some record.

If a man be sued to an exigent during the time he was in the king's wars, that is *matter in deed*, and not *matter of record;* and therefore he that will allege this for himself must come before the scire facias or execution be awarded against him; for, after that, nothing will serve but matter of record; that is, some error upon the process appearing upon record.

Matter, *Foreign*. See Foreign.

MATTEUCCI, Il Cavaliere, in *Biography*, a Neapolitan singer, possessed of a voice so extraordinary, and a manner of singing so perfect, that he was regarded at the head of his profession. After having been long in the service of the court of Spain, he returned to Naples, where he still lived in 1730. At fourscore years of age he had still a voice as firm, sweet, and flexible, as in his youth.

MATTHEIA, St., in *Geography*, a small island in the North Pacific ocean, about 140 miles from the south-east coast of Russia. N. lat. 60° 20'. E. long. 177° 10'.

MATTHESON, John, in *Biography*, a native of Hamburgh, was born in 1681. He was the son of a Lutheran clergyman, and seems to have been educated with great care. Among his early studies, at seven years old he was allowed a music-master, under whom he profited so rapidly, that at the age of nine he was able to sing to the organ, in the church at Hamburgh, anthems of his own composition.

But while he was so eagerly pursuing the study of music, he made himself master of modern languages, and applied part of his time to the study of the civil law, attending the public lectures by turns of two doctors learned in that faculty. But we shall chiefly confine ourselves to his progress in music, and the use he made of his attainments in that art; as his connection and conflict with Handel, early in their several lives, have rendered him an interesting personage to our readers of musical history.

At the age of eighteen he composed an opera in the German language, called the "Pleiades," and performed a principal part in it himself.

Handel, in 1703, at the age of nineteen, on the death of his father, in order to avoid being burthensome to his mother, went to Hamburgh, and engaged himself in the opera band of that city, as a second ripieno violin. He and Mattheson soon became acquainted, by accidentally meeting each other in an organ-loft, where Handel was practising at the time that Mattheson went thither for the same purpose. After this they studied and visited churches together, in order to exercise themselves on the organ.

As these young students lived much together, in great intimacy, they had frequent trials of skill, and, in friendly emulation, had frequent contentions in musical knowledge and talents: in the latter, it appearing that they excelled on different instruments, Handel on the organ and Mattheson on the harpsichord, they mutually agreed not to invade each other's province, and faithfully observed this compact during five or six years.

Mattheson tells us, that no one except himself knew that Handel could play on any other instrument than the violin; "but his superior abilities were soon discovered, when,

 upon

upon occafion of the harpfichord-player at the opera being abfent, he was perfuaded to take his place; for he then fhewed himfelf to be a great mafter, to the aftonifhment of every one except myfelf, who had frequently heard him before upon keyed-inftruments."

About this time an opera, called "Cleopatra," compofed by Matthefon, was performed on the Hamburgh ftage, in which he acted the part of Antony himfelf, and Handel played the harpfichord; but Matthefon being accuftomed, at the death of Antony, which happens early in the piece, to take the harpfichord in the character of the compofer, Handel refufed to indulge his vanity by relinquifhing to him that poft, which occafioned fo violent a quarrel between them, that, at going out of the theatre, Matthefon gave him a flap on the face; upon which, both immediately drew their fwords, and a duel enfued in the market-place, before the door of the opera-houfe: luckily the fword of Matthefon was broken againft a metal button upon Handel's coat, which put an end to the combat; and they were foon after reconciled.

This rencontre happened on the 5th of December 1704; and as a proof of their fpeedy reconciliation, Matthefon tells us that, on the 30th of the fame month, he accompanied the young compofer to the rehearfal of his firft opera of "Almira," at the theatre, and performed in it the principal part; and that afterwards they became better friends than ever.

On the 25th of February, in the next year, Handel produced his fecond opera, called "Nero," which had likewife a very favourable reception. It was at the end of the run of thefe two dramas that Matthefon, who performed the principal man's part in both, quitted the ftage, on being appointed fecretary of legation to fir Cyril Wych, refident at Hamburgh from the Englifh court.

Matthefon, with all his failings, was certainly a man of quick parts, diligent cultivation, and talents of various kinds; but, as a mufician, he had more knowledge than tafte. Many ftories were long in circulation at Hamburgh, concerning his pedantry, vanity, and eccentricities. Long after he had ceafed to play and compofe, he continued to write mufical treatifes, of which the names are now hardly to be found. All the mufic we have feen by Matthefon is fteril of ideas and uninterefting. It has been faid, that he was a great performer on the harpfichord, and that Handel often amufed himfelf in playing his pieces; in doing which, if ever he regarded Matthefon as a formidable rival, his triumph muft have been very complete in comparing them with his own, or with the inherent powers which he muft have felt of producing better whenever he pleafed. We are in poffeffion of twelve Leffons by Matthefon, engraved on copper by Fletcher, in tall folio of 18-ftaved paper, London, 1714, who, in a preface, fpeaks of them as "pieces which claim precedence to all others of this nature, as being compofed by one of the greateft mafters of the age, in a ftyle altogether pleafing and fublime."

They confift, like other fets of leffons of that period, of overtures, preludes, fugues, allemandes, courants, gigues, and aires; but notwithftanding the editor's eloge, they refemble all the harpfichord mufic which we ever faw, anterior to Handel's admirable "Suites de Pieces," firft fet in 1720; though, in good harmony, they imprefs the mind with no better idea of accent, grace, or paffion, than the jingling of triangles, or bells of a pack-horfe; and, indeed, are fuch as degrade the inftrument to the level of "founding brafs, and a tinkling cymbal."

There is a lift of Matthefon's works in Walther's Mufical Lexicon, as far as the year 1732, amounting to forty; but as he continued writing to the laft, and lived till 1764, it is probable that he kept his promife of printing as many works on the fubject of mufic as he had lived years, and ftill leaving to his executors as many more in manufcript for the ufe of pofterity.

Matthefon bequeathed at his deceafe all his poffeffions to the republic of Hamburgh, on condition that fuch an organ fhould be built for the great church as he defcribed in his will. It had not been long finifhed when we faw and heard it, in 1772; but we believe it to be the largeft and moft complete in Europe. It coft upwards of 4000*l.* fterling, was built by Hildebrand, is of 32 feet, has four fets of keys, long compafs, up to F in altiffimo, and, with the pedals, goes down to double double C. The keys are covered with mother-of-pearl and tortoife-fhell; the front is curioufly inlaid, and the cafe richly ornamented. There are 64 ftops in this organ; and a fwell attempted, but with little effect; only three ftops had been allowed to it, and the power of crefcendo et diminuendo was fo fmall, that if we had not been told there was a fwell, we fhould not have difcovered it.

Matthefon's picture is placed in the front of the organ gallery, and there is a Latin infcription under it recording the benefaction. This good man had more pedantry and nonfenfe about him than true genius. In one of his vocal compofitions for the church, in which the word *rainbow* occurred, he gave himfelf infinite trouble to make the notes of his fcore form an arch. What pity this arch was not reprefented in the front of his inftrument, where, upon the principle of Père Caftel's Clavecin Oculaire, his arch might have had all the colours as well as the curvature of the rainbow! See Pere Castel, and Clavecin Oculaire.

The rainbow ftory may ferve as a fpecimen of Matthefon's tafte and judgment with refpect to the propriety of mufical expreffion and imitation.

By his laft will and teftament, an anthem was performed at his funeral, which he had himfelf compofed for the occafion; but it excited more laughter than forrow, when heard in its old-fafhioned grace. Yet, in fpite of ridicule, he was certainly poffeffed of a great fhare of mufical erudition, and was of great ufe to his countrymen in his younger days, by bringing them acquainted with mufic of other parts of the world, and by introducing a better ftyle among them than their own. He was lefs fond of fugues than his contemporaries; but in his latter days he became a mere theorift, without tafte or feeling.

END OF VOLUME XXII.

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